

## **Technical Documentation**

### **Voice module SPL4-3 12V DC**

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0.2	30.07.2020	Publishing PC software 1.x.x.x	SU
0.3	17.09.2020	Changes to the line IN; Explanation of the software error code	SU
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1.1	18.01.2023	Change: PK2 omitted; Product overview added	SU

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## **4. List of Abbreviations**

ELS: Electroacoustic system

## 5. Safety Instructions

Please read carefully the safety and instruction manual before using this device! Follow all instructions that are in the User Guide (Manual) to achieve the optimal performance. Please keep these safety and operating instructions safe for further use.

### General Safety Instructions - Symbol Explanation



- refers to an information



- means warning and indicates a special situation



- indicates a hazardous situation which may cause to heavy or serious injury or even death

### 5.1 Personnel



The installation, commissioning and dismantling of the device must be done only by trained and authorized personnel. During installation, it is necessary to pay attention to the safety regulations defined by the user and local laws and rules.

### 5.2 Proper use of the Device

The equipment is designed exclusively for the intended purpose specified in the manual. Any other use and / or misuse of the device can lead to unpredictable risks including death and causes the loss of all the claims against the manufacturer.

## 5.3 Limitation of Liability

The manufacturer would not take over any liability for damages resulting from:



- the usage of the device by untrained and unauthorized personnel,
- use of device for not intended purpose
- opening and/or manipulation of the device
- not following the manual and safety instructions

## 5.4 Electric Current

### **!!Danger of life from electric current!!**



Direct contact to the parts of the device will cause an electric shock. In case of damage to the insulation, the device must be switched off immediately and the damaged area must be de-energized.

While maintaining on the device, ensure that the power supply is off at all times and make sure the device is de-energized.

## 5.5 Electric Shock



If objects (e.g. hairpins, needles or coins) or liquids fall into the device, it can cause life threatening electrical short-circuits, which can lead to fire. The user has to make sure that above mentioned objects, especially made of metal and/ or liquid things, will not fall in to the device intentionally or unintentionally.

## 5.6 Safety Operations



The operation and use of the device is to be done by instructed and authorized personnel only.

## 5.7 Power Supply

The equipment exclusively operates with the operating voltage indicated in the manual.

## 5.8 Cable Connection



When installing the cable connections, the user needs to pay attention to the safety regulations. Always pay attention to the connection to the protective earth ground! Pay attention when connecting with other devices, that those have to be of the same earth potential (same heavy current/voltage side).

## 5.9 Ventilation

The equipment must be installed in so that good ventilation to the device is ensured. Do not put any covering objects on the device, such as newspapers, books or towels.

## 5.10 Water and Moisture



The device is not allowed to operate in close vicinity of electrical conductive liquids or moist areas. It is not allowed to place any liquid things on the device or in the nearby area of the device.  
**Attention: Danger of Electric Shocks!**

## 5.11 Temperature and Heat

The operating temperature of the device is defined in the specifications. The device must not be placed near things which produce heat such as to blowers, heaters, furnaces or other devices.

## 5.12 Opening the Device



Never open the body of the device. Touching the internal parts can lead to a dangerous electric shock. It is not permitted to make any changes in the device.

## 5.13 Cleaning



Do not use any volatile solvents such as alcohol, diluents, gasoline etc. to clean the device. Only use a dry, clean cloth.

## 5.14 Unusual Smell



If any unusual smoke or smell occurs, immediately switch off of the device and remove it from the main power supply! Contact your dealer or the manufacturer.

## 5.15 Fuses

**The replacement of the fuses in the device is only permitted by trained and authorized technical staff.**



The change of the fuses is only allowed when the device is switched off and is removed from the main power supply. Otherwise there is a risk of electric shocks. The security functions and safety values are mentioned in the manual. The guarantee for this equipment will expire in case of using other fuses than those specified in the manual.

## 5.16 Repairing

The user is not allowed to perform the maintenance work by himself, except for those specified in the manual. All maintenance and repair work must be done by trained and authorized technical personnel.

	<b>Special Safety Instruction</b>	
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**For the specific safety information about the device, please refer to manual!**

## 6. System Description

The Voice module SPL 4 -3 is an independent and freely programmable sound replay system, designed for all applications which demand both highest quality of sound as well simple, flexible operation and programming.

In view of possible future functions a consistent ISP programmability of the system has been realized.

Through this, a new firmware version can be simply programmed with a special mobile programming device even to modules which are already delivered and installed.

With the comfortable programming software the voice module can be programmed (also if it is already built-in) with new announcements or drive schemes. Through this the voice module can be adapted to changing requests anytime.

The on board memory stores up to 180 seconds of sound files at a 22 kHz sampling frequency rate.

The SPL 4-3 can be easily installed by means of 4 fastening drillings and is also available with two different housings.

### 6.1 Replay Functions

- Replay of files in the wav format 8 bit unsigned 22 kHz, mono
- Storage of up to 127 files
- Loop Operation (repeat), Loop lock or mixed Operation possible
- Combinations of Files via the Next function (e. g. plays different files with only one start signal)
- Interruption justifiable Announcements definable (priority circuit stages)
- replay by external amplifiers
- Short-circuit-proof 7 Watts Amplifier, directly regulable

### 6.2 Controls

- By 4 opto-coupled trigger inputs with one common return. All protocols like Grey, Binary, 1 out of N or customer designed protocols are programmable. A signal length of 100 ms is required

## 7. Hardware

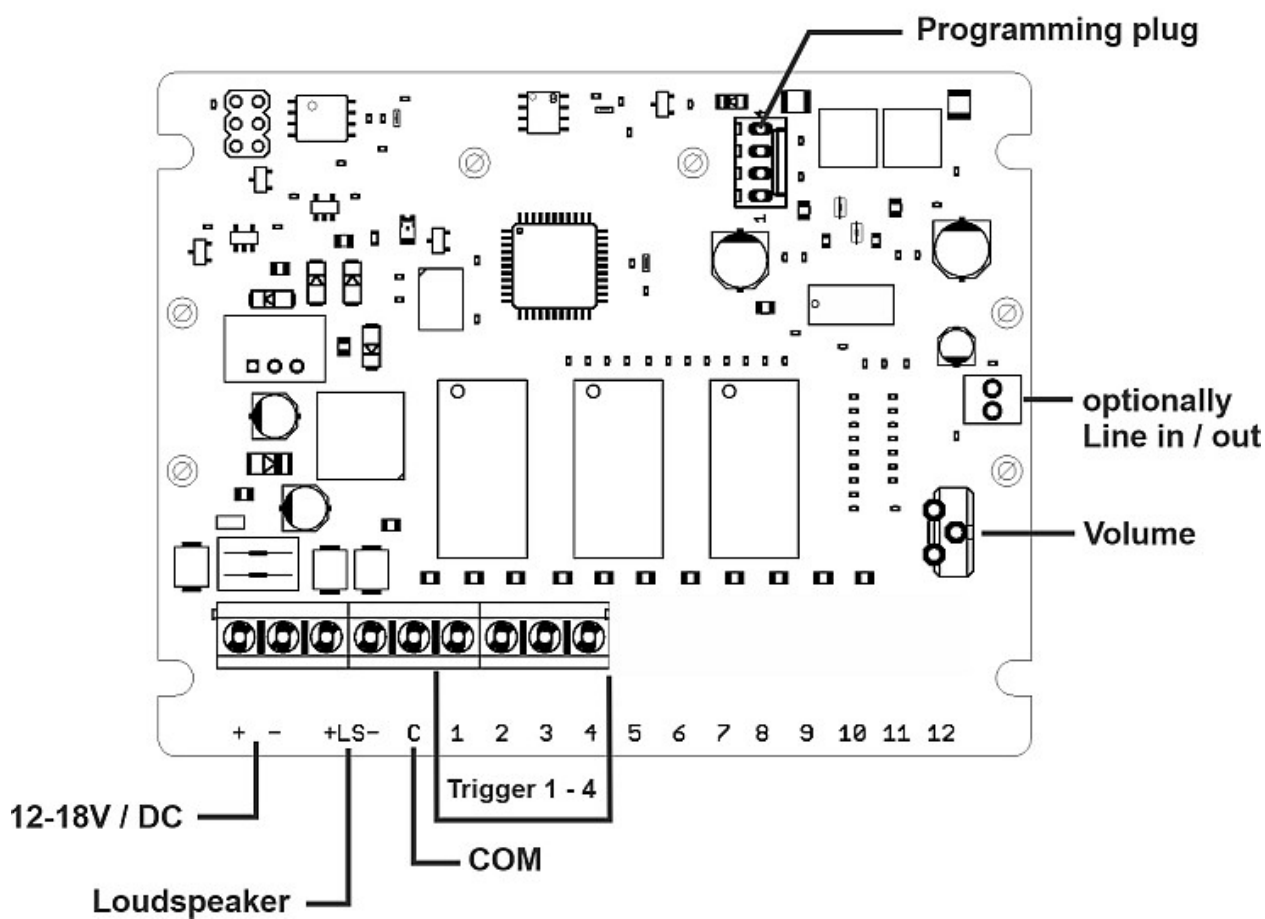


Figure 1: Connection diagram

## 7.1 Connection example

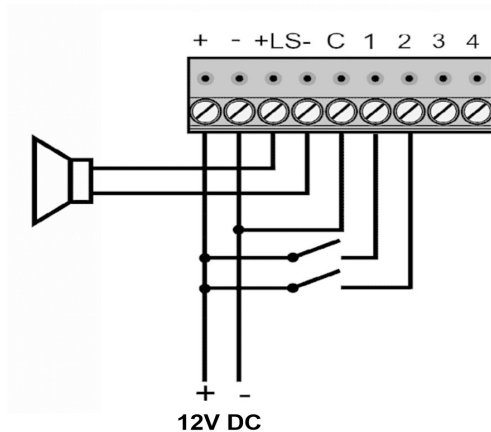


Figure 2: Connection example

<b>+/-</b>	Power Supply 12 Volts
<b>LS</b>	Speaker min. 10 W at 4 -16 $\Omega$
<b>C (COM)</b>	Common Return of Trigger Inputs (positive or negative)
<b>Trigger</b>	Freely programmable, potential-free inputs for start signals 5 – 26,4 V DC, selectable positive or negative (acc. to the polarity at COM), signal length min. 100 ms
<b>Line in / out</b>	Audio in / out for external signals
<b>Prog</b>	Connection for Programming Cable PK3; Optional: Slot for plug-in modules

## 7.2 Dimension Diagram

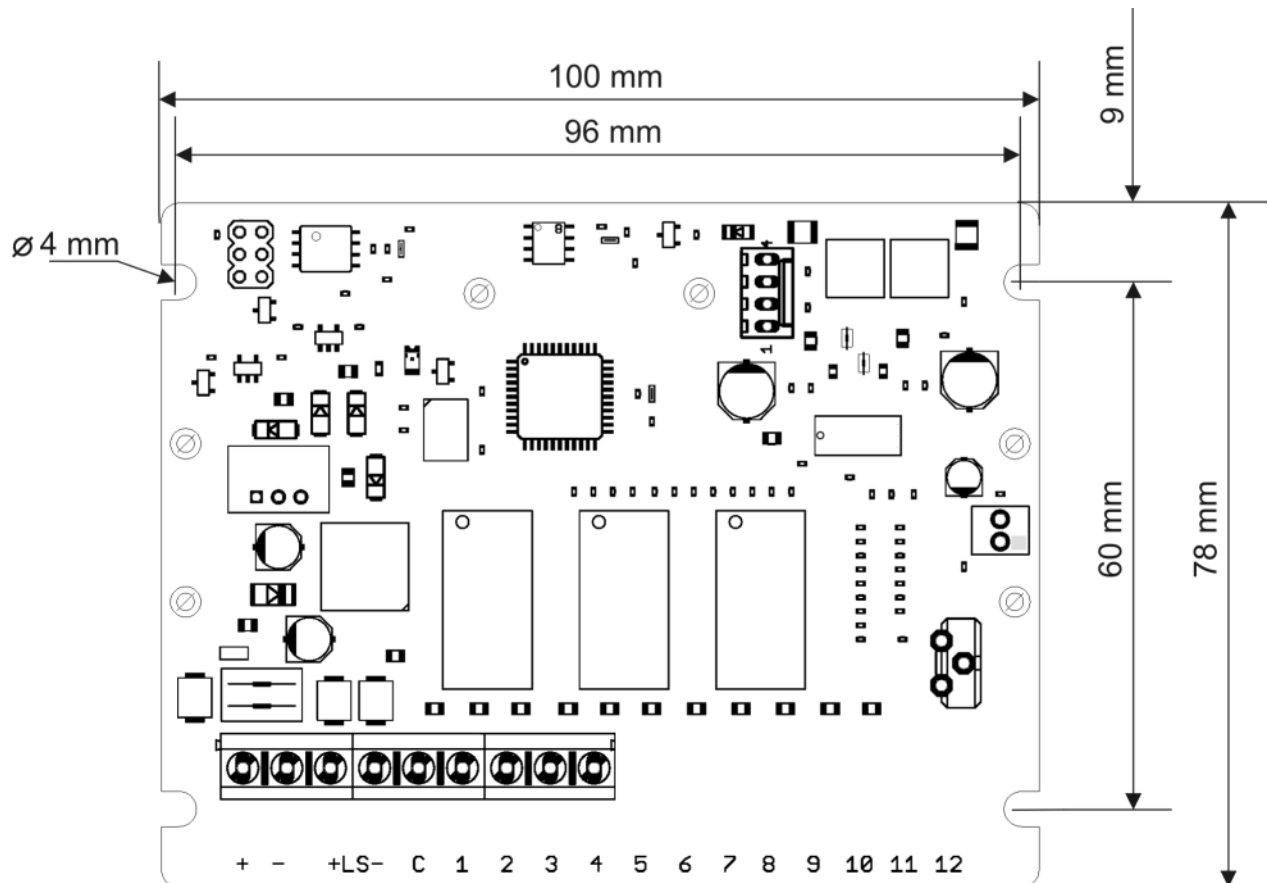


Figure 3: Dimension Diagram

### 7.3 Technical Data

Supply Voltage	: 12V DC/ 1A (A 24V DC variant can be ordered separately.)
Voltage tolerance	: -2% / +50%
Inrush current	: 1,3A for 1,2ms
Signal Voltage	: 5..26,4V DC/AC Signal Length 100 ms Potential-free Inputs
Quiescent current	: 11mA
Operating current	: 0.15A at 12V DC (1,2W; 1KHz sine to 8 Ohms)
Audio Output	: 7W <sub>peak</sub> , R <sub>L</sub> = 8 Ohms
Speaker	: 4..16 Ohms
Dimensions PCB L x B x H	: 100 x 78 x 25 mm
Dimensions Housing	: 130 x 94 x 58 mm (IP 66) or
Memory	: 32 MBit (180 sec. at 22kHz sampling frequency)
Weight	: 0,06kg
Addressable Records	: 15
Sampling frequency	: 22kHz
Line - IN	: max. 2,5V AC
Line - OUT	: max. 30mV AC
Operating temperature range	: -30°C to +45°C
Range of application	: Application in residential and commercial areas (class B)
Emission	: The values according to EN 61000-6-3 /01.07 + A1 /03.11 are kept within the EMC limits.
Immunity	: The values according to EN 61000-6-1 /01.07 are kept within the EMC limits.
Test report no.	: PL190615

## 7.4 EMC requirements

The voice module SPL4-3 uses a class D power amplifier. Characteristic of such an amplifier is a signal at the speaker output, which still contains rectangular components. To comply with the EMC requirements, the following measures are required:



For cable lengths greater than 15 cm at the speaker output, the customer must attach a ferrite core as close as possible to the speaker terminal of the SPL4-3.

2 turns of the loudspeaker line (both wires) are wound on the ferrite core.

The ferrite core is part of the scope of delivery of the voice module.  
Technical data of the ferrite core: *Snap ferrite 241Ohms @ 100MHz*

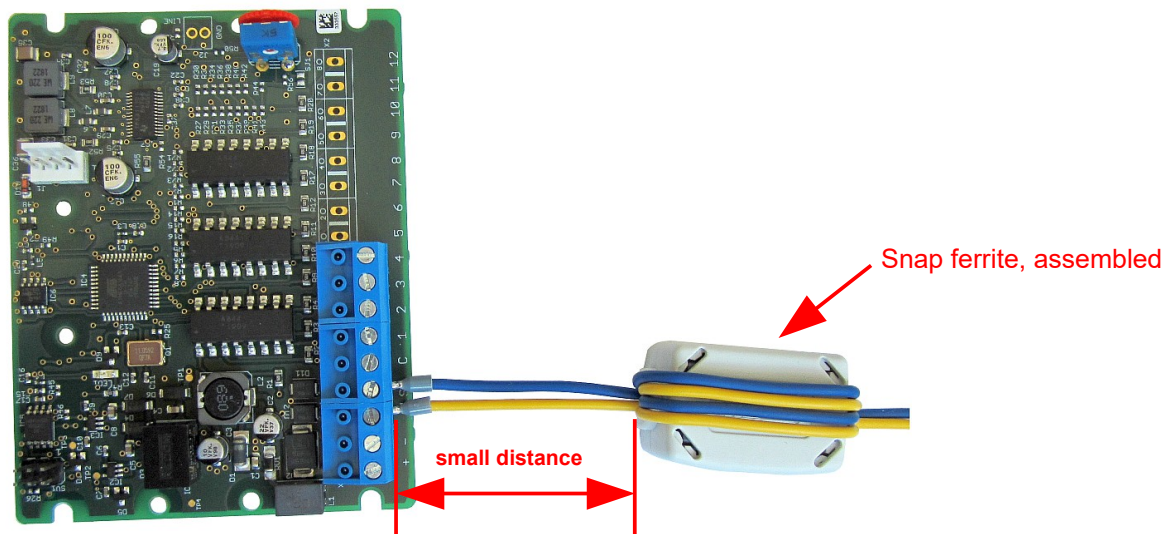


Figure 4: Snap ferrite, mounted

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## 8. Software

For the transmission of the announcements into the voice module a software is needed, which registers at the same time also the configuration of the project. Configuration in this case means the connection between text number, control and "wav" file. The required software (SPL Editor v2.0.zip) is provided for the voice modules.

Operating system: Windows 7,8,10,11 additionally .NetFramework from version 4.7.2

Hardware required: A serial interface (COM). For PCs without a serial interface, you must connect a USB serial adapter before the software is started.

Screen resolution: 1366x768 Pixel (or higher)

No permanent installation of the software on the PC is required. A ZIP file is provided. You have to unzip this into a shared folder. The following files are then in this folder:

SPL Editor v2.0.exe : Application ("v2.0" represents the version number and may differ)

SPL\_Help.chm : Help file

Readme.txt : Installation information

The latest program version is available on our homepage at:

[www.veinland.net](http://www.veinland.net)

It is advisable to occasionally compare the software version you have with the version published on the homepage.

## 8.1 Summary of process sequence

- 1: Select the type of voice module
- 2: Select file ((1))
- 3: Set parameters ((2) / (3) / (4))
- 4: Add ((5))
- 5: Set volume on line in/line out ((6))
- 6: Store/load configuration ((7))
- 7: Select the interface ((8))
- 8: Transfer configuration ((9))

Note:

*The numbers in parentheses refer to Figure 6 on the following page.*

***The programming software cannot be used without a serial interface!***



***Make sure that there is a serial interface on the PC before starting the software.***

*If your PC no longer has a built-in serial interface, please use the programming cable PK-3 (see Figure 31) or a USB plug adapter (see Figure 32).*

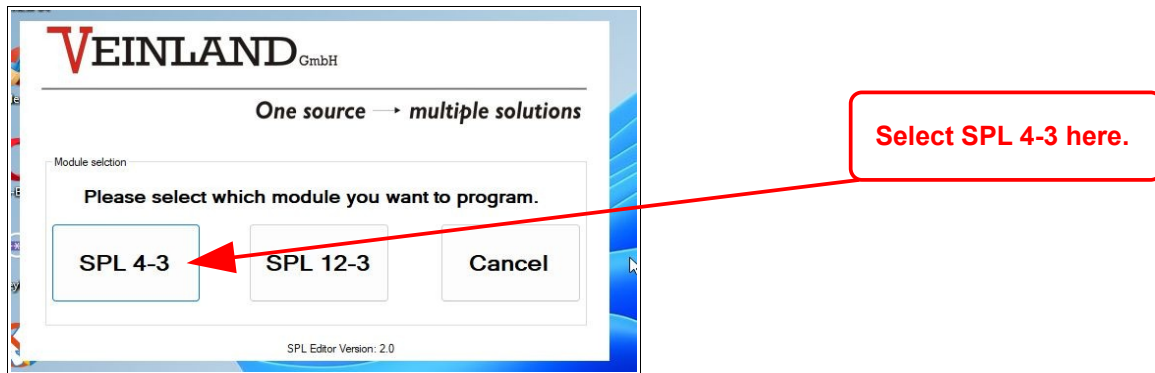


Figure 5: Splash screen for module selection

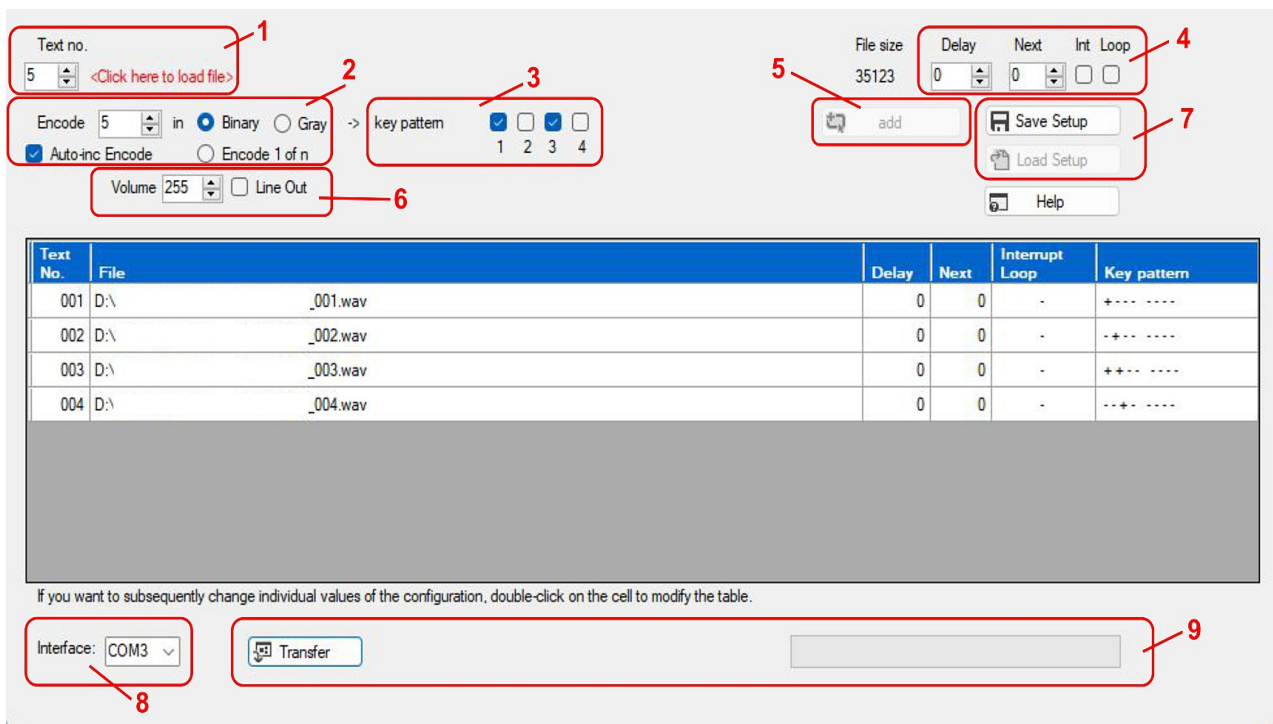


Figure 6: View of the programming interface

## 8.2 Description of the programming procedure

1. Click on the text **<Click here to load file>** to load WAV file. An Explorer window will open from where the file can be selected. Highlight the selected file and click "open". You will now see the file path.
2. Now select the appropriate code template (Binary - Gray - 1aN). By activating the **"Auto inc encode"**, the trigger for the announcements will be automatically set to successive ascending order.
3. The trigger can also be set manually by using the trigger box (only Binary- and Gray- Code). Using the same method you can also define an additional start trigger.
4. If from one start signal, more than one file should be played back in sequence (e.g. a gong before the announcement), enter the text number (line number) in the field "Next" the following announcement. By clicking on the "Delay" field a pause between announcements may be added. Should an interruption ("Int") or a loop ("Loop") be intended for the announcement then the appropriate field must be clicked.
5. Enter the selected configuration settings by clicking on the "Add" field.  
Repeat the steps 1 – 5 until all desired announcements are entered in the configuration.
6. If the "Line in/Line out" function is to be used, the output volume of the "Line out" is set pressing up/down here.
7. Here the configuration in process may be saved or a stored configuration may be loaded.
8. Select a serial interface on the PC here.
9. To transfer the data to the voice module, please press the "Transfer" button. Depending on the amount of data to be transferred, the process can take some time. You can follow the current status of the data transfer in the progress bar.

### ATTENTION:



After a successful transfer of the data the module must be separated from the supply current, only then will the announcements be played.

## 8.3 Editing a configuration

A configuration has become editable with version 2 of the SPL Editor. You can make changes to the table visible in the main window at any time by double-clicking on the changing cell. After the changes you should save the entire configuration with "Save Setup".

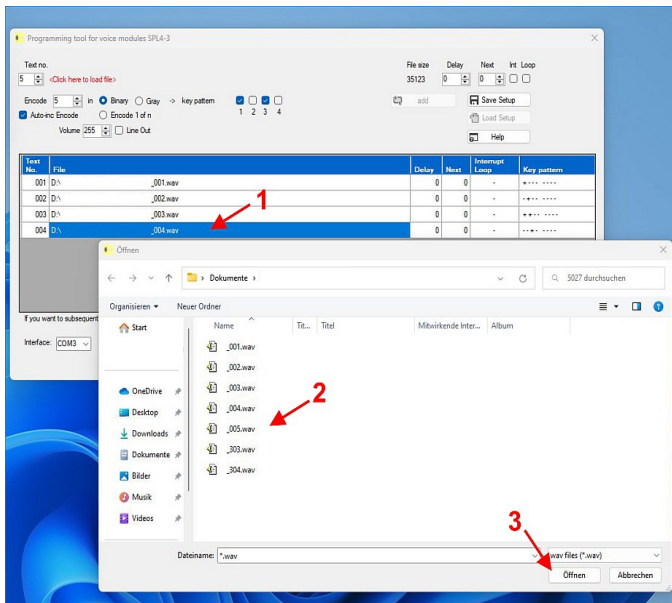


Figure 7: How to change a file to be played.

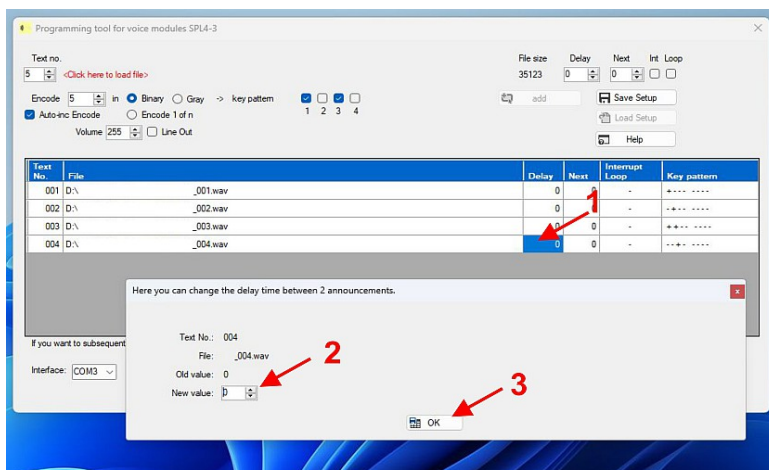


Figure 8: How to change the delay time between 2 announcements.

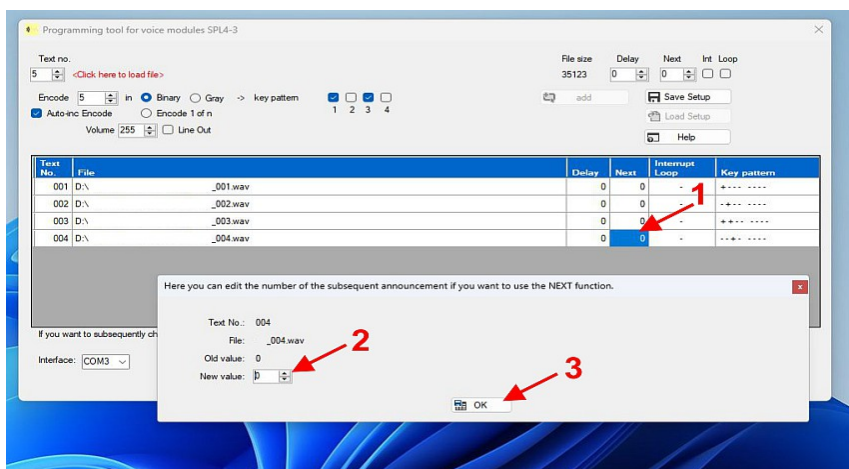


Figure 9: How to change the text number of a subsequent announcement.

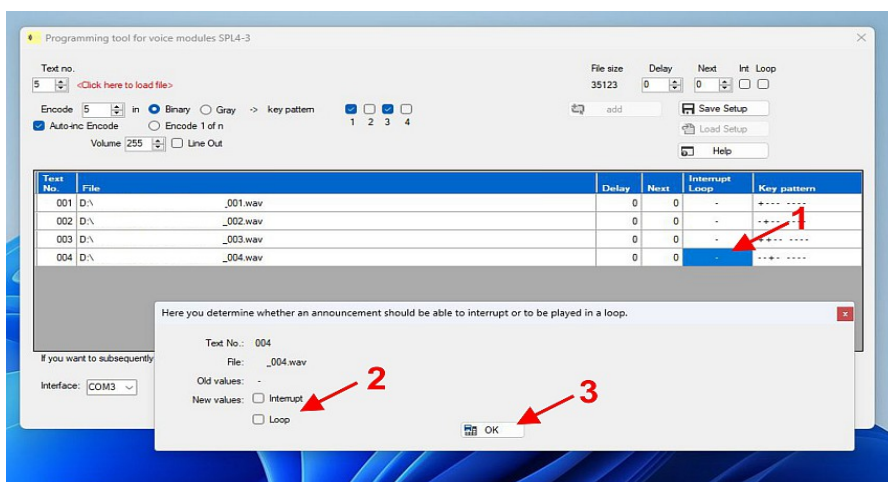


Figure 10: How to change the interrupt functionality.

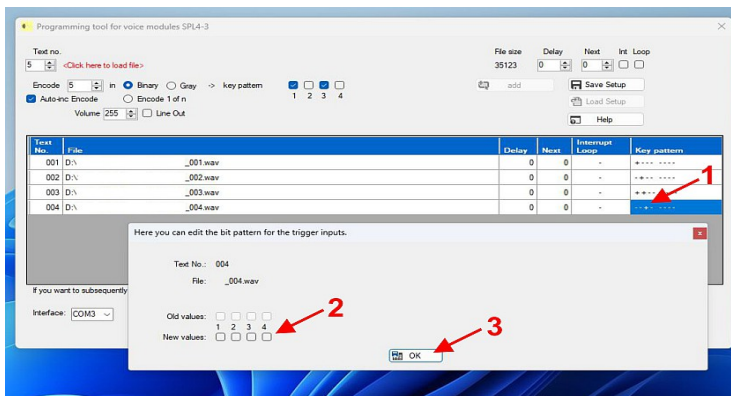


Figure 11: How to change the bit pattern for controlling the announcements.

## 8.4 Error messages

The program is able to recognize certain errors itself. An example: An attempt was made to open a file that was in the wrong WAV format. The program cannot process the data contained in this file. For this reason, you will receive an error message as shown in the following figure:

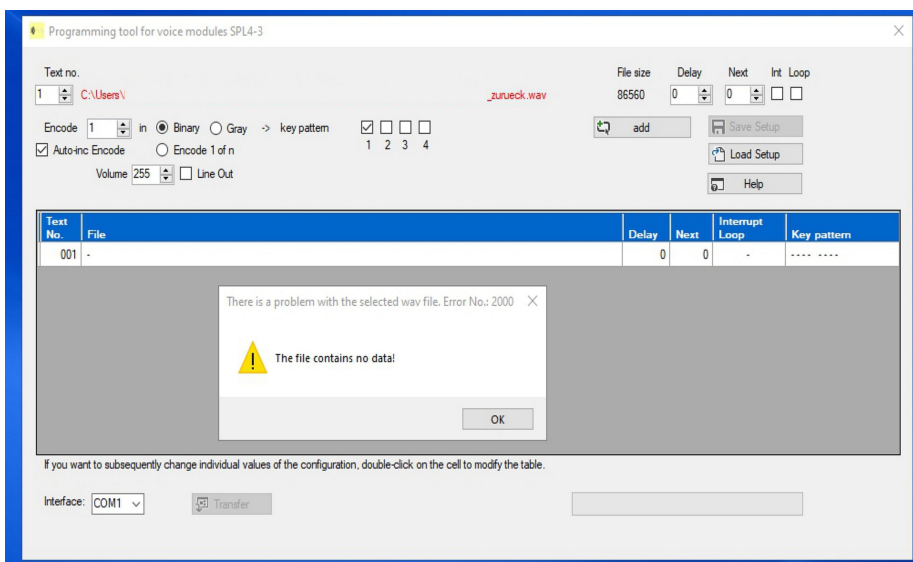


Figure 12: Example: Error message "2000"

With the new software version, the file to be loaded is examined even more deeply. A precise check is carried out to determine whether the structure of the "wav" file strictly adheres to the Microsoft specifications. Unfortunately, not all programs for editing audio files adhere to these specifications. However, so that your announcements can be played back on the voice module, compliance with the Microsoft specifications is absolutely necessary. In the event of an error, the PC program "SPL Editor 2.0" shows you what the structure of the "wav" file does not correspond to the Microsoft standard:

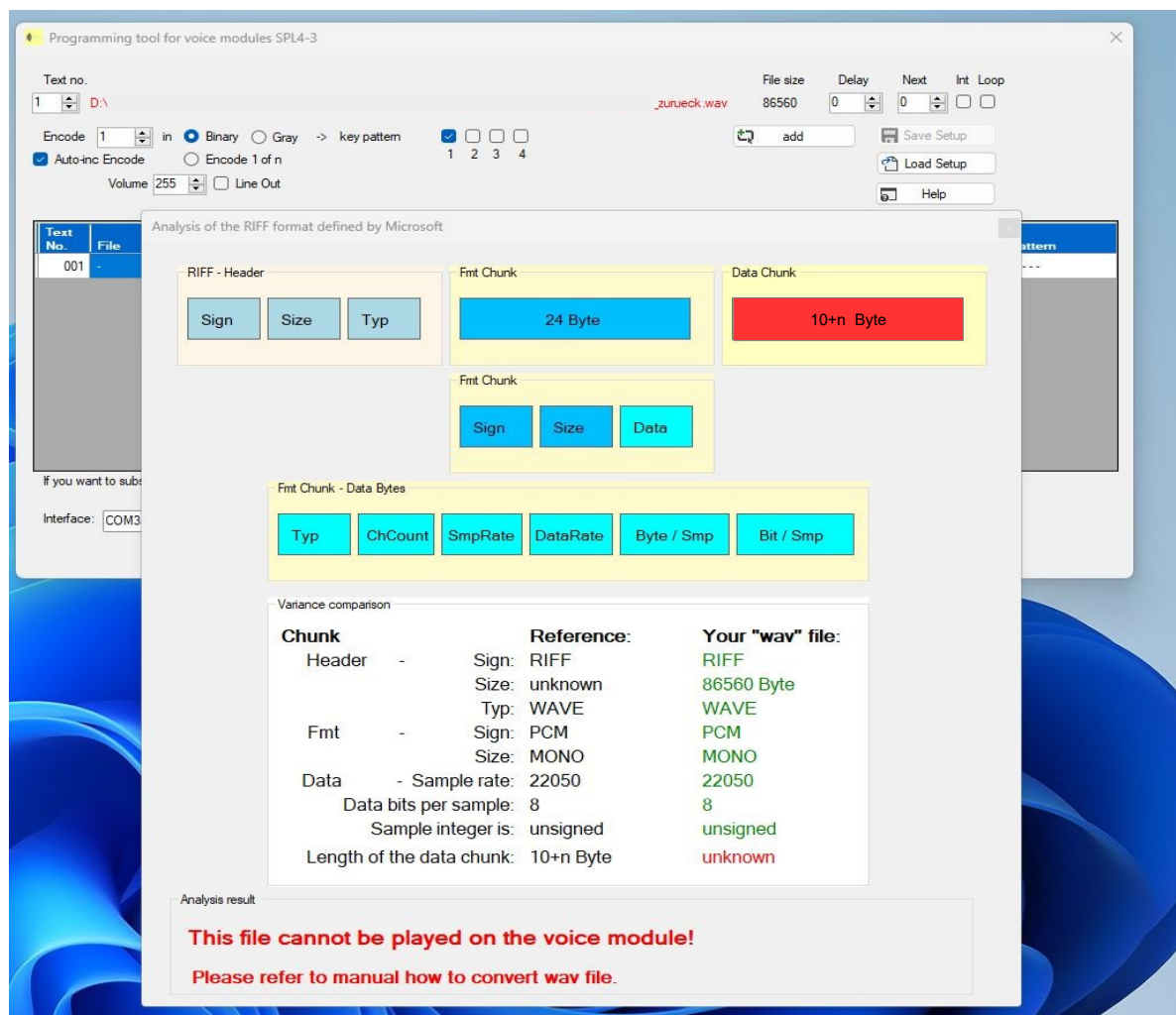


Figure 13: RIFF format analysis

In the present example, the length of the audio data was not specified in the file. **As a result, this file cannot be played on the voice module!** The file is not added to the configuration to be created. The only way to remedy this is to convert the "wav" file with another audio editing program. Please read the section 8.5

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"Processing of announcements" carefully. It not only describes the editing, but also gives you a recommendation for audio editing software. If all your conversion efforts are unsuccessful, please feel free to email us. You will then receive an offer to convert your "wav" files.

Whenever you receive an error message, the announcement cannot be added to your configuration. The error number is important for determining the cause (here: Error No. : 2000). The following table shows the error numbers used in the program:

Error number	Message text	Possible cause	Rectification
1000 1001 1002 1003	No serial interface was found on this PC. The program is now ended. Then connect a USB serial adapter and restart the software.	No serial interface was found on the PC used.	Connect a USB to serial converter. Then restart the program.
2000	The file contains no data!	The "Data" section of the WAV file was empty or unreadable.	Convert the WAV file to the correct format. If necessary, use a different program.
2001	The file is not in 8-bit format!	The data in the WAV file is not in 8-bit format.	Convert the WAV file to the correct format. If necessary, use a different program.
2002	The file's sampling rate is incorrect. Sampling rate of the present file is: xxxxx	The sampling rate of the WAV file used is incorrect.	The correct value is 22050.  Convert the WAV file to the correct format. If necessary, use a different program.
2004	The file is compressed.	The WAV file is in a compressed format and cannot be processed.	Convert the WAV file to the correct format. If necessary, use a different program.
2005	The file header is invalid.	The data frame of the WAV file is invalid.	Convert the WAV file to the correct format. If necessary, use a different program.
2006	The file header is invalid.	The data frame of the WAV file does not begin with "RIFF".	Convert the WAV file to the correct format. If necessary, use a different program.
3000	The file cannot be opened.	File selection: Error opening.	Choose another file.
3001	The configuration file could not be written.	Error while writing the file: The name is wrong or the data is invalid.	Please choose a different filename.
3002	The desired configuration file could not be loaded. The file header appears to be damaged.	Loading the configuration file failed. The file is damaged.	Choose a different file or recreate your configuration.

Table 1: Error numbers

## 8.5 Processing of announcements

So that the announcements you have created can be used on the voice module, the WAV files must be in the correct format:

Designation	Value
Sampling rate	22050 samples / second
Data bits per sample	8 Bit
Samples	Unsigned Integer
Format	Mono

*Table 2: Format of the WAV file*

The recording devices for the announcements usually produce a better quality audio file (e.g. stereo). In most cases you will need to edit and convert the files you have recorded. There are various programs for this on the market. We recommend that you use the “Goldwave” software ([www.goldwave.com](http://www.goldwave.com)). The following description of the process of editing the announcements relates to this program.

First open the program and then load your raw file with the announcements into the program. Before further editing the announcements, first apply a low-pass filter to the imported file. This removes the frequency components that are not relevant for the voice module and would only lead to a deterioration in the announcements played.

So choose: „**Effect**“ → „**Low/ Highpass**“

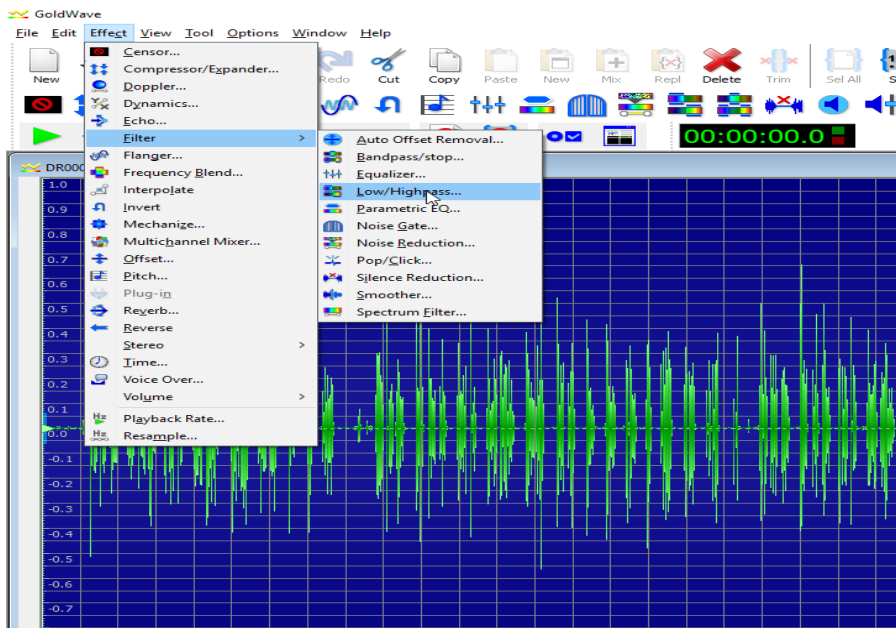


Figure 14: Select low pass filter

Select **“Preset 9000”** in the filter settings and press ok.

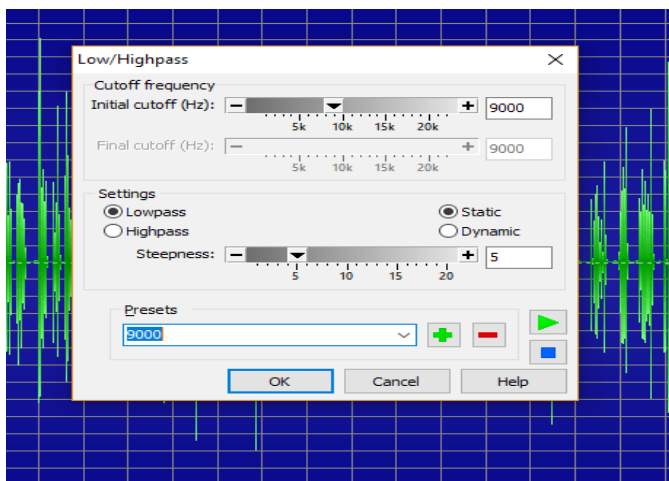


Figure 15: Values for the low pass filter

You can remove unwanted passages by choosing: **„Effect“** → **„Volume“** → **„Match Volume“**

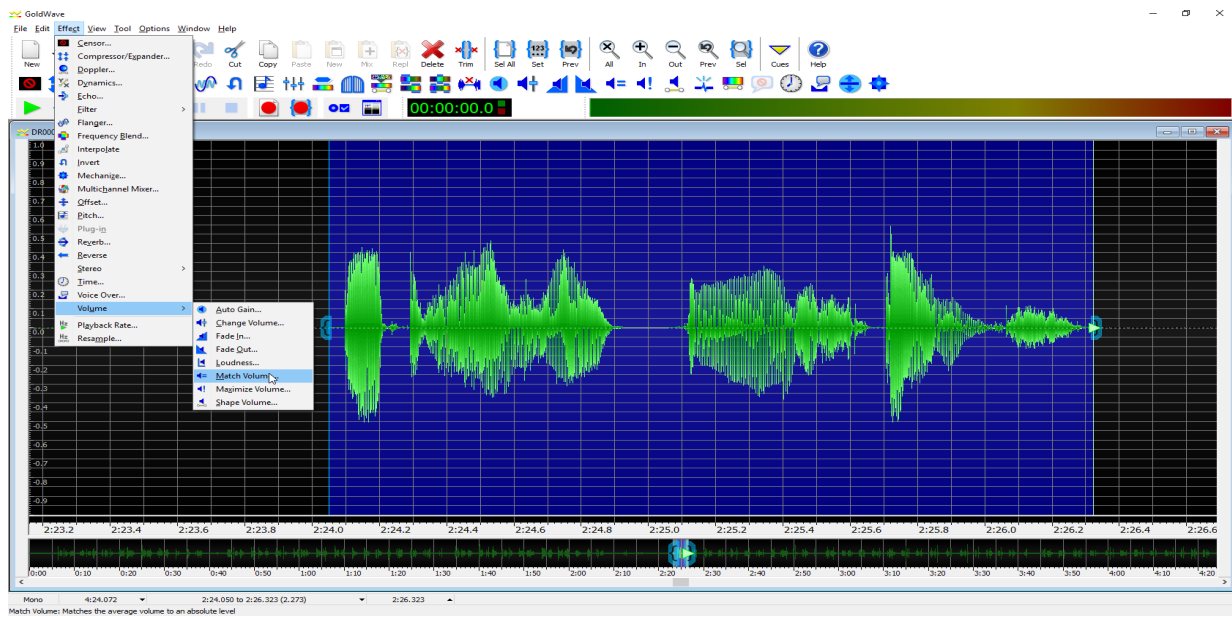


Figure 16: Remove unwanted passes

Occasionally only short passages in the text need to be made inaudible, e.g. a hiss or a throat clearing. To do this, mark the part that should be "muted" and then select: „Edit“ → „Mute“

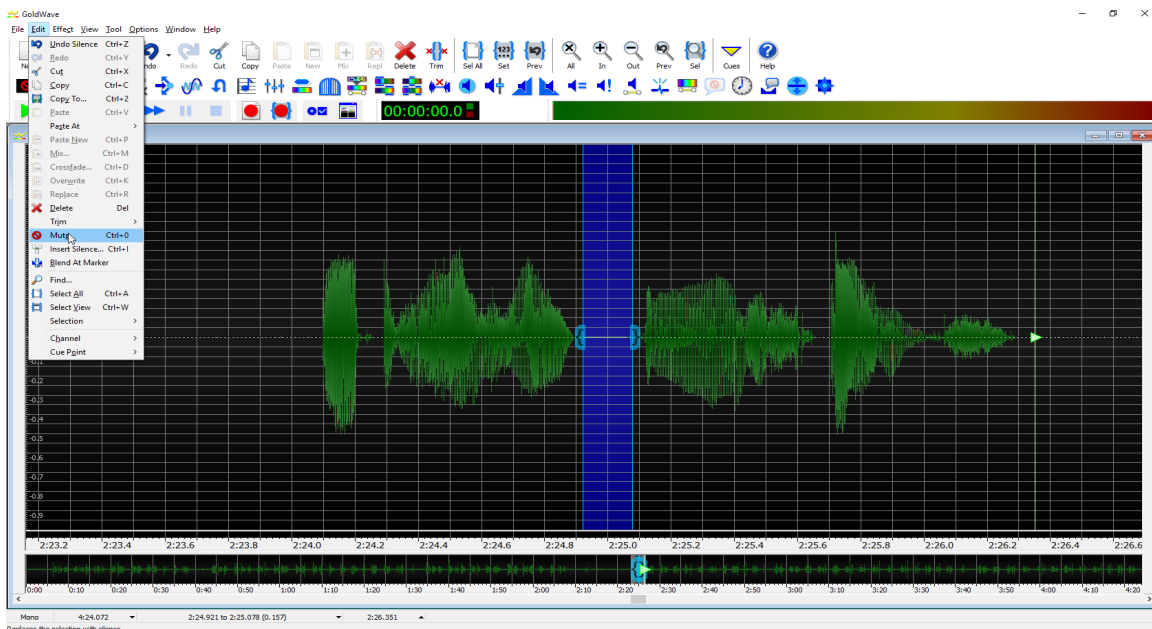


Figure 17: Mark part of the announcement for mute

When you have finished editing your announcement, mark the entire part that you want to use. Then save the selection via **"File" → "Save Selection as"**. Repeat saving for all parts of your announcements that you want to use. Then you have edited all the announcements from the recording file, separated them and saved them as a file.

First close the "Goldwave" software. **Closing is absolutely necessary before you can start converting to the correct output format!**

Open the software again for further editing and select: **"File" → "Batch Processing"**

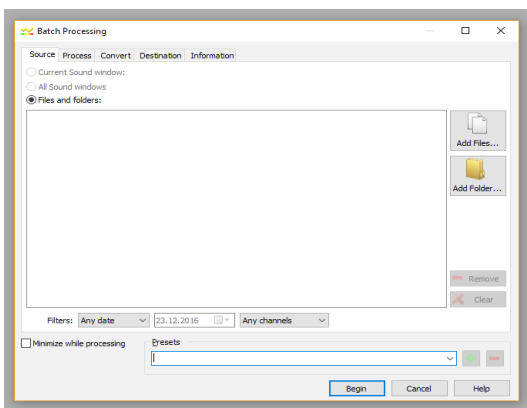


Figure 18: Batch Processing

Click on **"Add Files"** to be able to select the individual files previously stored.

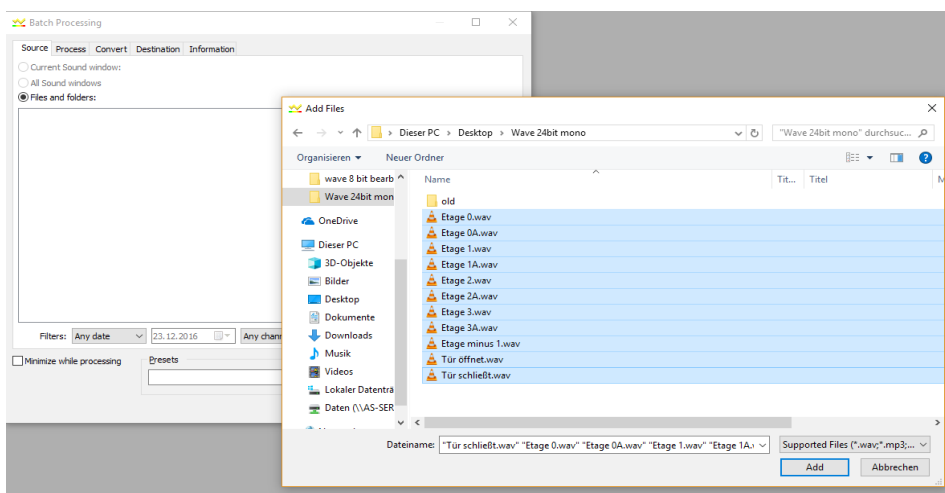


Figure 19: Select WAV files for conversion

Select all files that you want to convert and then press **"Add"**:

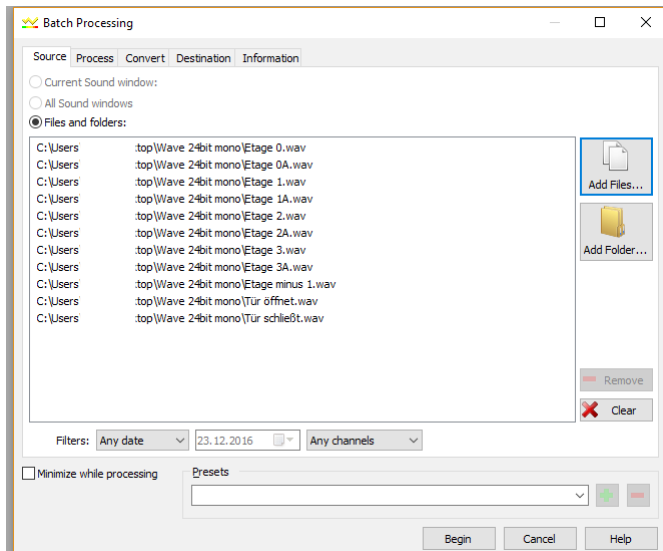
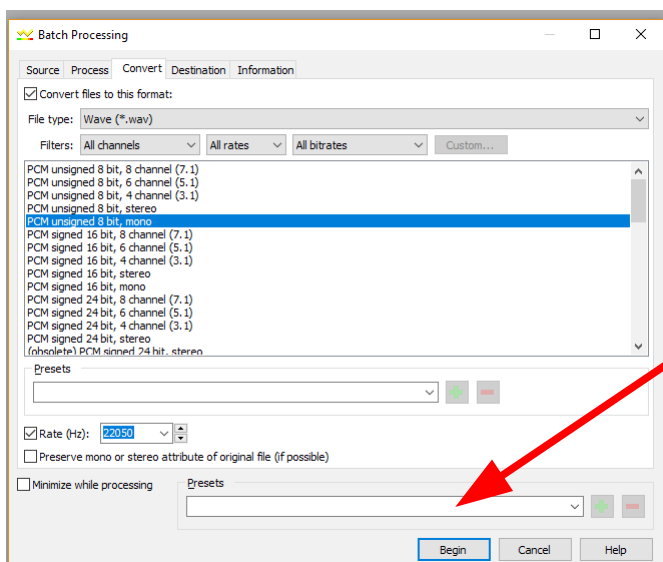


Figure 20: Select "Convert"

Another window then opens in which you can specify the format:



Adjustment :

22050 8 Bit unsigned mono

Figure 21: Define the conversion format

Then select the destination under which the files to be converted are to be saved.

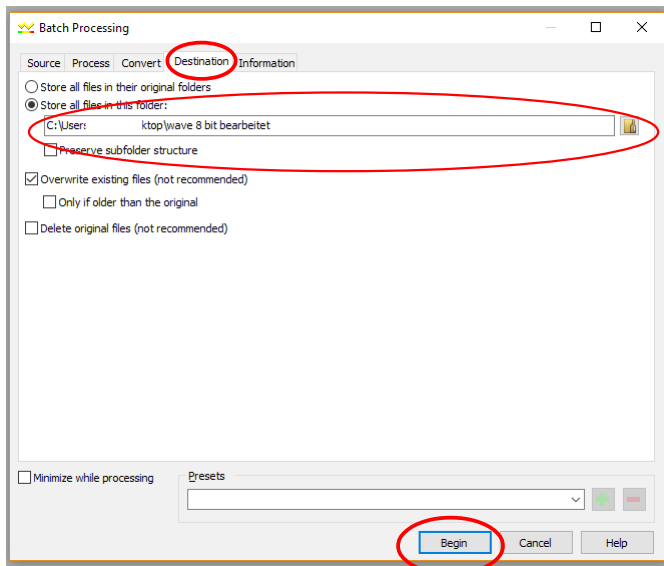


Figure 22: Specify the storage location for the conversion

After specifying the location, press “Begin” and the software will convert the specified files. When the program has finished its conversion work, the files are ready to be imported into the voice module.

**Note:**

The well-known “Media player” is no longer available under Windows 10. The player used by default by Windows 10 has *difficulty* playing an 8-bit mono file. You should therefore use another program to play the converted files as a test.

## 8.6 Renaming the serial interface (COM)

In the event that you use a USB serial adapter and the name of the connection name assigned by the operating system (e.g. COM19) cannot be found in the software for programming the language modules, the connection name must be renamed. The following illustrations refer to Windows 10. The procedure is similar for older versions of Windows:

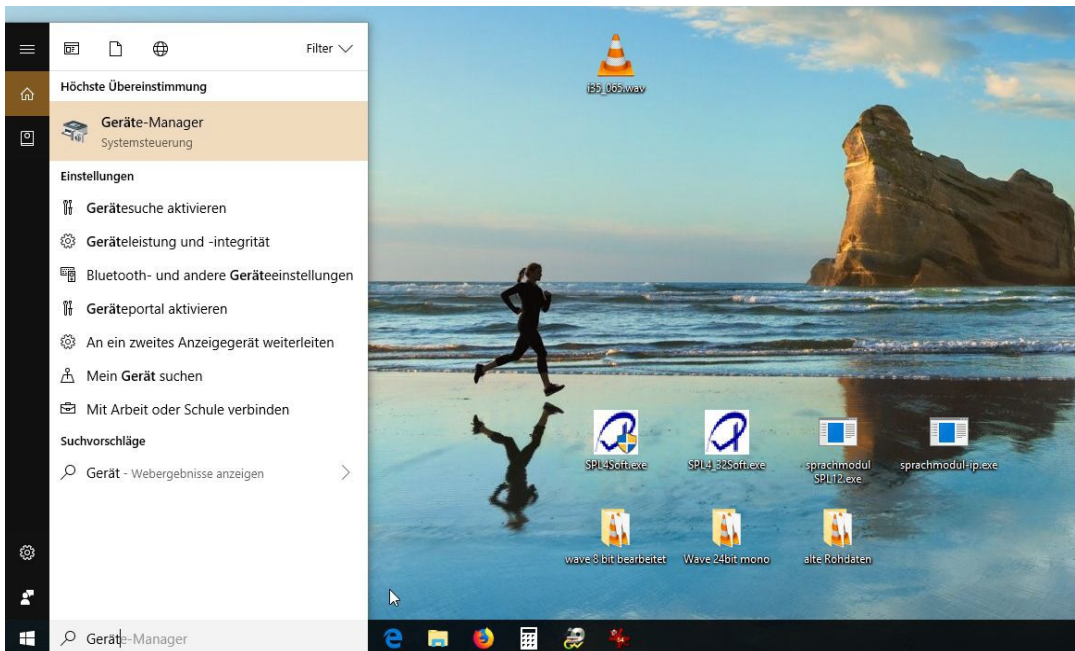


Figure 23: Find the device manager

1. Enter the term "Device manager" in the search field of the task bar and pay attention to the field "Highest match".
2. Click on "Device Manager - Control Panel" and the device manager opens.

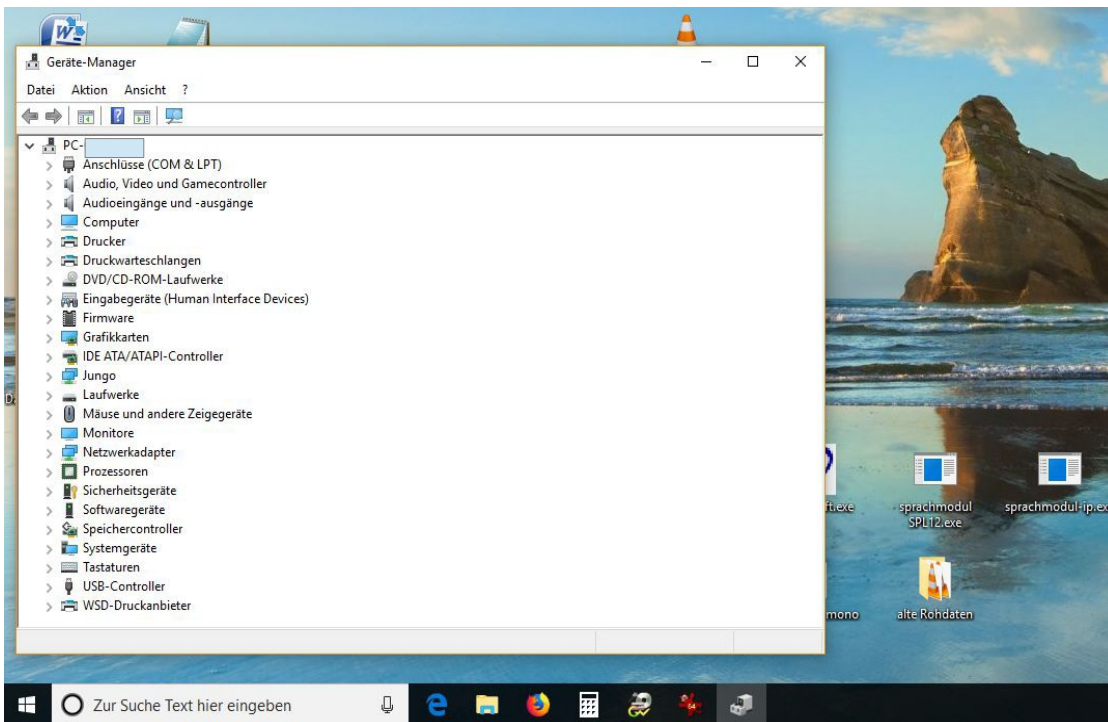


Figure 24: The device manager is open.

3. In the device manager click on the entry "COM and LPT connections". Pay attention to subentries if there are several serial connections on the PC. Select the entry you want to change.

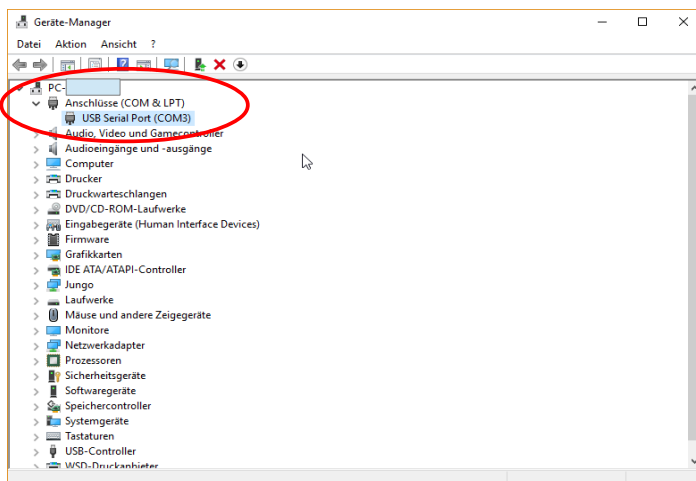


Figure 25: Select serial port to change

4. A window opens in which the properties of the selected connection are displayed:

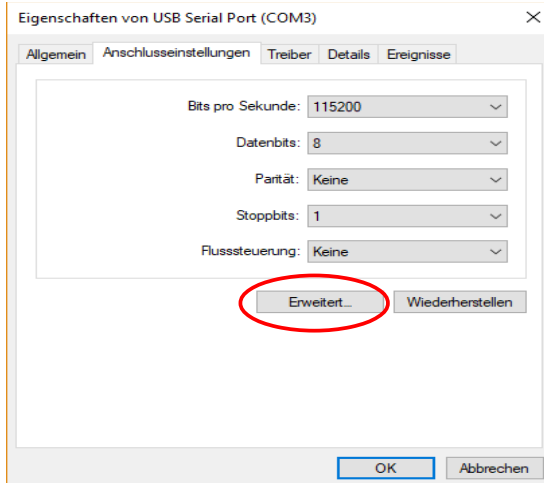


Figure 26: Serial port properties

5. Press the "Advanced" button. Then another window opens:

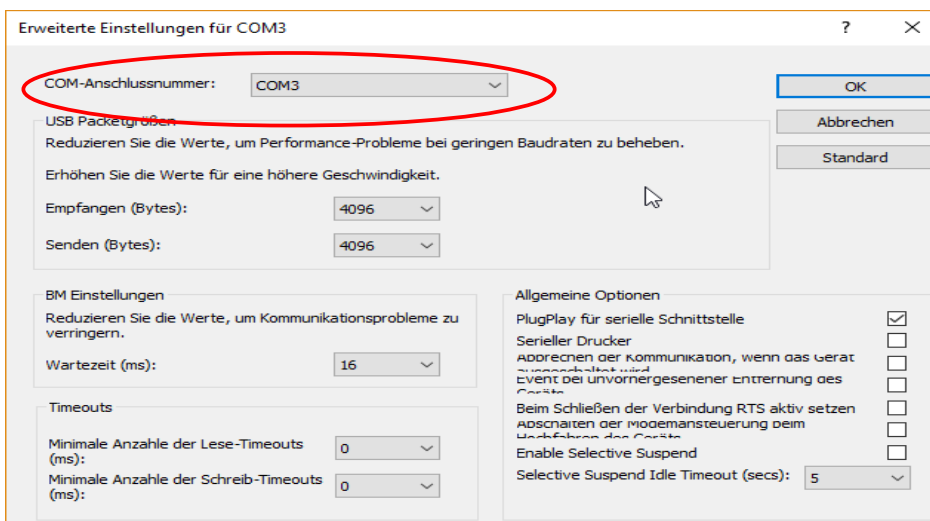


Figure 27: Advanced settings for COM x

6. Assign a new number of your choice in the "COM port number" field.

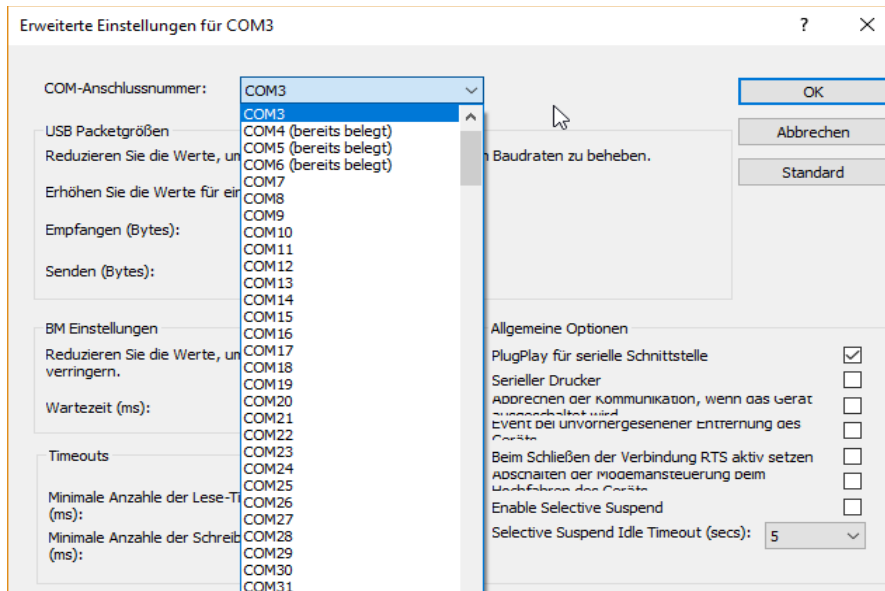


Figure 28: Reassigned COM port number

## 9. The triggering of announcements via the RS232 interface

The data transmission to the SPL4-3 is serial with 115200 Baud 8 Datebits without parity and with one Stop bit.

The data are transmitted as ASCII characters. Each message begins with the ASCII character '.'. This is followed by the number of bytes sent (number of (visible) ASCII characters), the command number, possibly further data and the checksum. The message is completed with the characters <CR> and <LF>. The characters <CR> (hex 0xd) and <LF> (hex 0xa) are not counted as sent bytes.

The sum of all (logical) bytes over a message must be 0x00. There can be a maximum interval of 50ms between each byte of a message. If there is a long pause between two characters, the voice module clears the buffer and waits for the beginning of a new message.



To trigger Announcement 1 the following message is sent:

.092001d6<CR><LF>

In detail :

- '.' as start character
- 09** Length of all sent ASCII characters before the CR including the '.'
- 20** Operation code for triggering the announcements
- 01** Number of the text to be announced
- d6** Checksum is formed from  $09 + 20 + 01 = 2a$ . In order to get now as a sum over the message 00, the two's complement of 0x2a must be entered so 0xd6.

The voice module answers with:

.0b20xxnn<SUM><CR><LF>

At the position xx either 00 (Ok text is played) or ff (Text can not be played) is sent. 'nn' stands for the number of texts contained in the voice module.

The status 0xff is obtained e.g. if:

- Announcement 20 was requested, but only 10 announcements are programmed on the voice module.
- The voice module is currently playing another announcement.

If bit 7 is set in an announcement, then the announcement can interrupt a possibly still running announcement.

If an announcement is played back on a module programmed with 10 announcements and at the same time the requesting of announcement 1 is requested, the module responds with .0b20ff0acc <CR> <LF>. **The requested announcement will not be played.**

If the announcement 0x81 (announcement 1 with bit 7 set) is requested, the module responds with .0b20000ac6 <CR> <LF>. The current announcement is interrupted and the requested announcement becomes played.

## 10. The use of the line connection

### 10.1 The playback of external signals

To play external signals, use the Line In input:

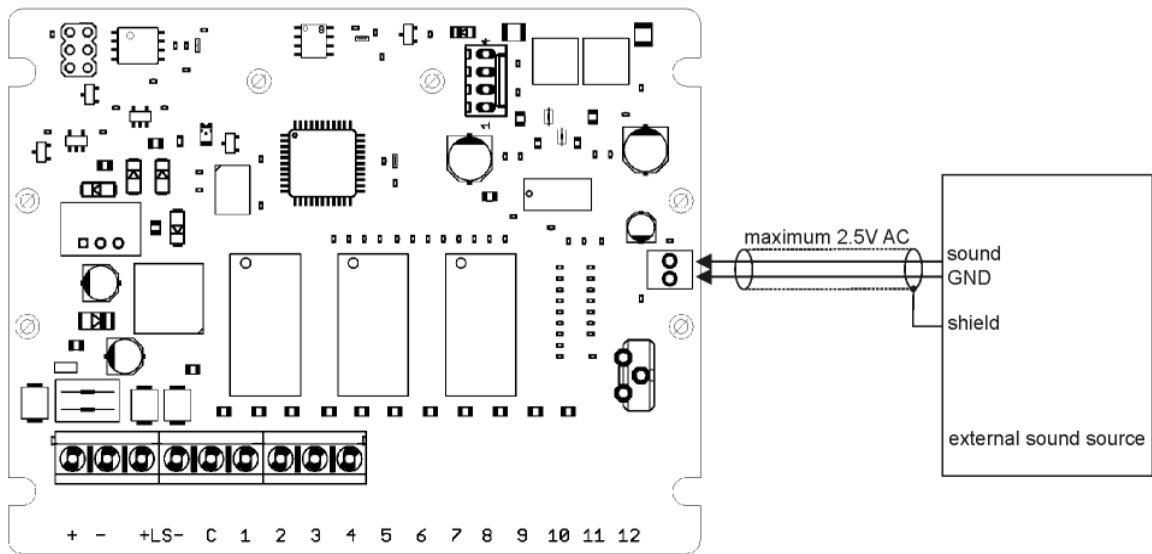


Figure 29: Line In- input

Connect the external signal source to the voice module via a shielded cable. The external signal source may deliver a maximum level of 2.5V AC. The input resistance of the voice module is 10K ohms. Avoid ground loops as they will usually cause a hum. The Line - IN signal is automatically reduced to the minimum volume during an announcement by the voice module. This keeps the announcement always clear and understandable. The volume of the external signal is determined during programming ("7" in Figure 6). The following relationship applies:

Volume	Volume of the external signal
255	Maximum volume.
127	Lowering to half the signal strength.
0	External signal is minimal but not zero.

Table 3: Lowering of the external input signal

## 10.2 The voice module sends a signal to an external system

The voice module can also provide announcements to an external electroacoustic system (ELS). To do this, connect the voice module according to the following scheme:

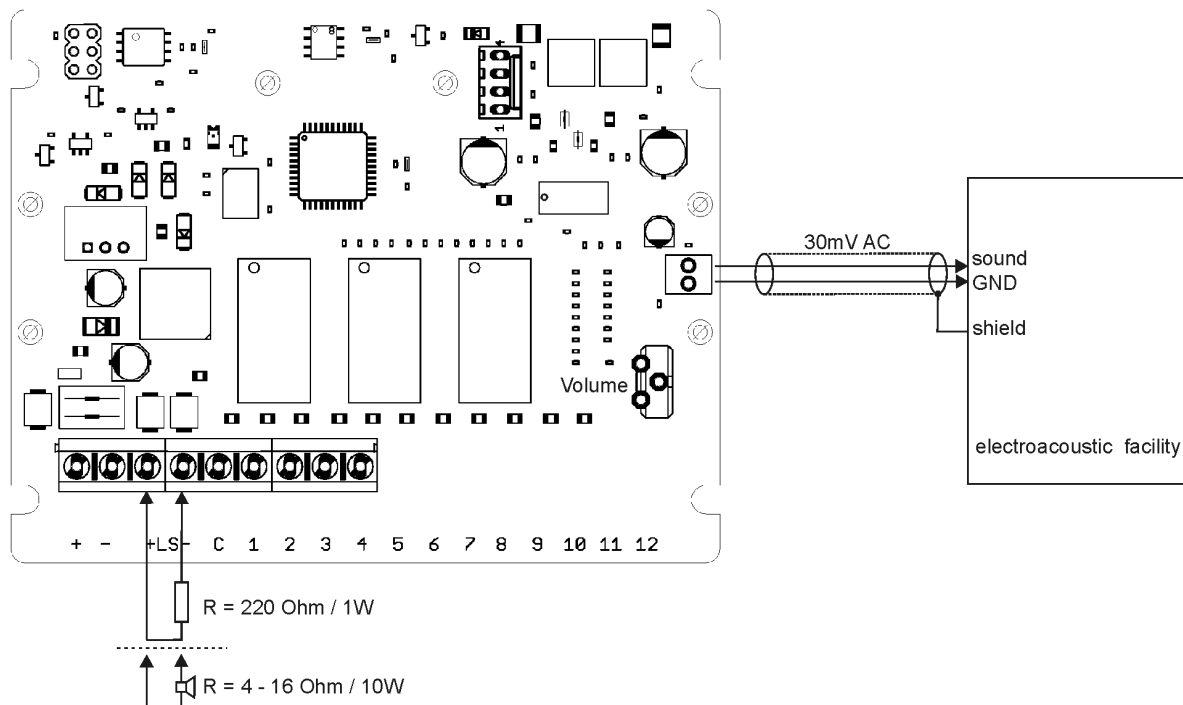


Figure 30: The voice module provides a signal



The volume control of the voice module also affects the output level.

The output level is a maximum of 30mV AC.



If the internal power amplifier of the voice module is not used, a replacement resistor greater than 200 ohms must be connected instead of the loudspeaker.



You can also connect the power amplifier of the voice module as normal to a speaker and still use the line-out function. The electroacoustic system (ELS) is then additionally controlled.

Connect the external electroacoustic system (ELS) to the voice module via a shielded cable. The output

resistance of the voice module is 10K ohms. Avoid ground loops as they will usually cause a hum. To use this function, the software must have the check mark **"LINE OUT"** set. See **"7"** in Figure 6. The settings for the output volume can be found in Table 2:

Volume	Volume of the output signal
255	Maximum volume.
127	Lowering to half the signal strength.
0	No output signal.

*Table 4: Output volume of the line-out function*

## 11. Accessories for voice modules

### 11.1 Programming accessories

The voice modules can be programmed as often as desired and also directly on site, when installed, with announcements and control schemes. For this you need a software (see description under "8. Software") as well as a programming cable.



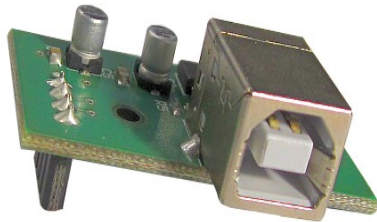
*Figure 31: Programming cable PK-3*

The level converter built into the plastic housing is supplied with voltage from the voice module. For this reason, the PC does not recognize the PK-3 programming cable until the voice module is supplied with voltage. The following connection sequence must be observed:



1. Supply voltage to the voice module
2. Connect the PK3 to the voice module
3. Connect the USB connector to the PC
4. Start the programming software

The range of programming adapters is rounded off by a USB plug-on module. You can attach this module directly to the programming interface of the speech module:



*This programming adapter is intended for permanent mounting on the voice module.*

*It is better to use a PK-3 to import the announcements once.*

Figure 32: USB-FTDI plug-in adapter

A driver (Virtual COM Port Driver) is required for both the PK-3 and the USB FTDI plug-in adapter, which Windows usually installs itself. If this does not happen, you can find the latest driver under:

<https://ftdichip.com/drivers/vcp-drivers/>



**If you use an RS232 plug-on module (see 11.4), you need special programming cables, as the level converter is already included in the plug-on module!**

These are presented below:

- |   |                         |
|---|-------------------------|
| 1. Cable for RS232 module 2,5m SUB-D; 9- pole | Item number: vtp 302044 |
| 2. Cable for RS232 module 2,5m open end       | Item number: vtp 302045 |



Figure 33: Programming cable vtp 302044



Core colors:

Brown - RxD  
Green - TxD  
White - GND

Figure 34: Programming cable vtp 302045



These two cables may only be used together with the RS232 plug-on module!

## 11.2 Housing

We offer optional a small housing KG12 with the following features:

- Plastic housing light gray polystyrene
- Flame retardant
- Impact resistant
- Temperature resistant up to 70°C
- Dimensions: 130x94x57mm

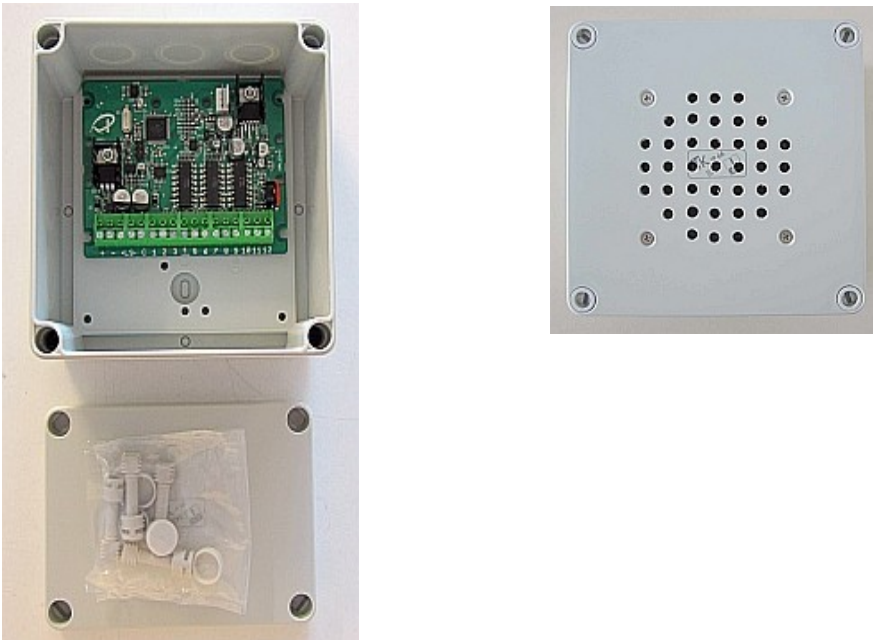


*Figure 35: Small housing KG12*

The housing KGG12 offers you more space for wiring. It is particularly suitable if other components must be accommodated in the housing. It has the following properties:

- Plastic housing light gray polystyrene
- Flame retardant
- Impact resistant
- Temperature resistant up to 70°C
- Dimensions: 130x130x75mm

The housing cover can also be supplied with holes for speakers.



*Figure 36: Housing large KGG12*

For mounting on a DIN rail (standard rail, C rail), the language modules can be equipped with retaining clips:



*Figure 37: DIN rail mounting*

### 11.3 Loudspeakers

The loudspeaker LS20 / 8 convinces with its warm sound and is suitable for installation or setup. A ready-made cable is available on request.

Frequency range	: 130 – 20 000Hz
Power handling capacity	: 15W / 8 Ohm
External dimensions	: Diameter 80mm x 37mm
Installation size	: Diameter 75mm x 37mm
Magnet	: Diameter 60mm



*Figure 38: Loudspeaker LS20 / 8*

The LS 15 loudspeaker is intended where there is little space for installation with a wide of 50mm. For various installation situations. We will also deliver the cable with fitted connections as specified.

Frequency range	: 130 – 20 000Hz
Power handling capacity	: 15W / 8 Ohm
External dimensions	: 90.5mm x 50.5mm
Installation depth	: 45mm
Magnet	: Diameter 48.5mm



*Figure 39: Loudspeaker LS15*

The LS 20 WP is designed for outdoor environment or in a damp / wet atmosphere. This water resistant loudspeaker needs less space for the installation with a depth of only 29mm. We will also deliver the cable with fitted connections as specified.

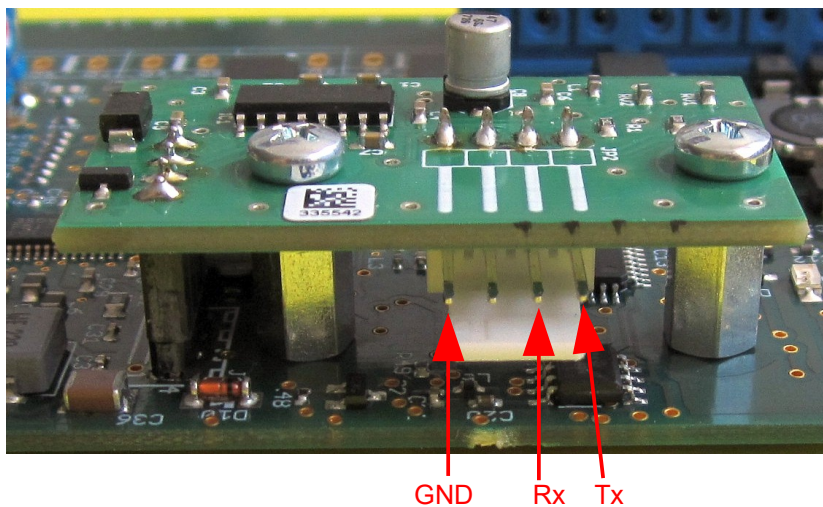
Frequency range	: 180 – 10 000Hz
Power handling capacity	: 20W / 8 Ohm
External dimensions	: Diameter 85.5mm x 29mm
Installation depth	: 29mm



*Figure 40: Loudspeaker LS 20 WP*

## 11.4 RS232 plug on module

This plug-on module extends the voice module by an RS232 interface (V24). Only the signals RxD, TxD and GND are supported. The signals are made available in standards compliant levels. The plug-on module is required, for example, to trigger announcements (as described in point 9).



*Figure 41: RS232 module for plugging onto the voice module*

SPL12-3 and plug-on module require an installation height of 25mm. For connection to external control devices we can offer the following cables:

- |   |                         |
|---|-------------------------|
| 1. Cable for RS232 module 2.5m SUB-D; 9 pin | Item number: vtp 302044 |
| 2. Cable for RS232 module 2.5m; open end    | Item number: vtp 302045 |

## 11.5 RS485 plug on module

The voice module can also be expanded with an RS485 plug-on module. This is currently under development.

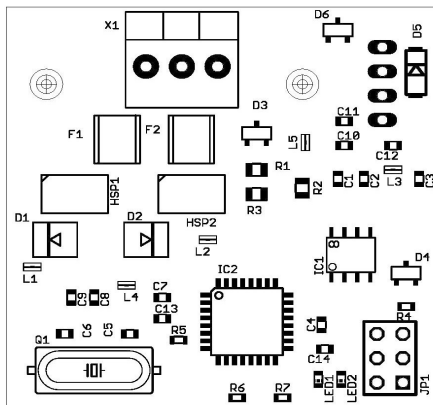


Figure 42: RS485 module for plugging onto the voice module

## 12. View of the voice module SPL 4-3

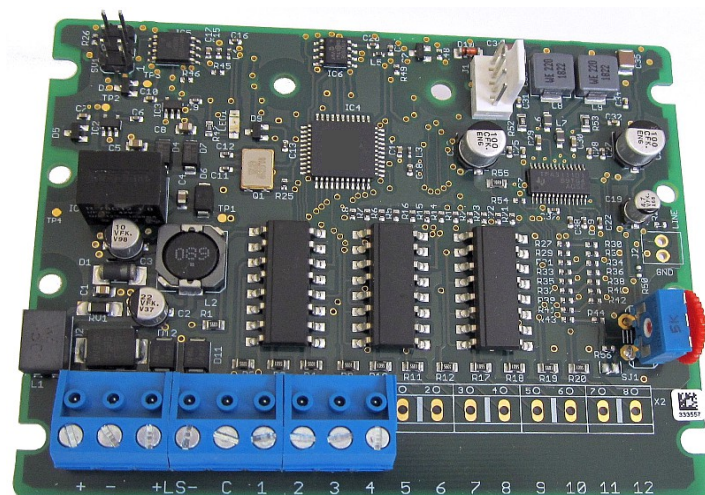


Figure 43: View of the voice module SPL 4-3

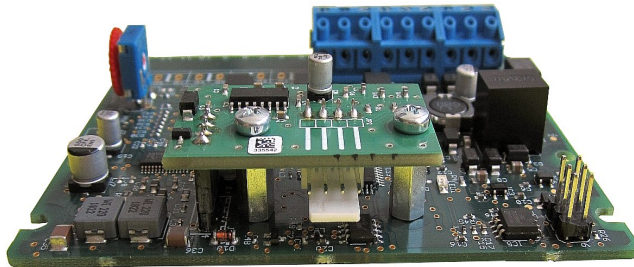


Figure 44: Voice module with mounted RS232 interface

### 13. Product overview voice module SPL4-3

Module type	Operating voltage	Item number	Line In/Out	RS232
SPL4-3	19-27V DC	vtp 349300	NO	NO
SPL4-3	12-18V DC	vtp 349301	NO	NO
SPL4-3	19-27V DC	vtp 349306	YES	NO
SPL4-3	12-18V DC	vtp 349307	YES	NO
SPL4-3	19-27V DC	vtp 349310	NO	YES
SPL4-3	12-18V DC	vtp 349311	NO	YES

Table 5: Product overview voice module SPL4-3

Notice:

Only the standard modules are shown here. Please contact us for special configurations (e.g. Line In/Out and RS232).

## 14. Contact information

Changes with the meaning of technical progress reserved.



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