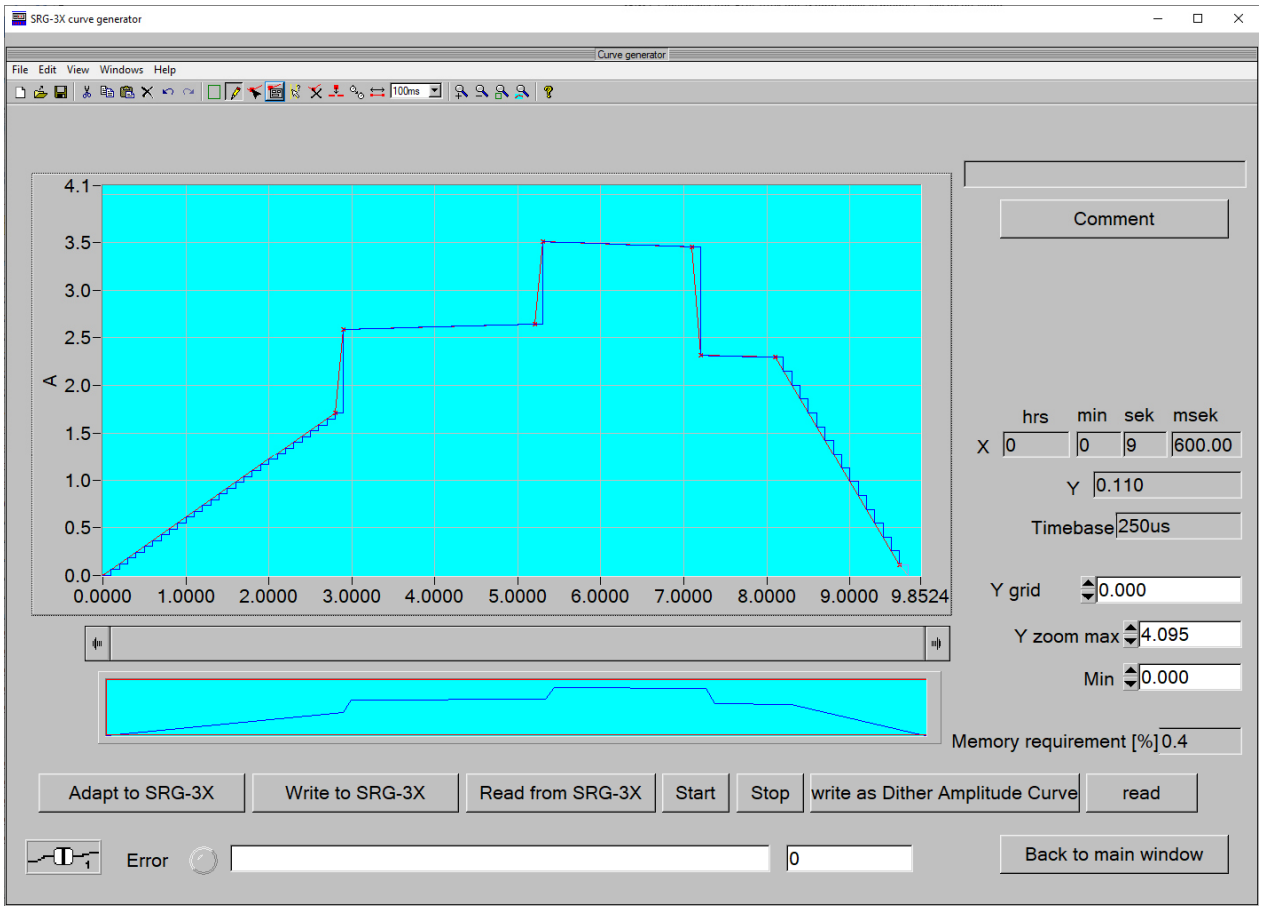
User Manual

SRG 3 A X2 Curvegenerator Version V1.3

PC-Software to create current and dither-amplitude curves for the PWM-Current-Regulator SRG 3 A X2

From Version 1.3 of the curve generator pc-software and software version V2.10 of the SRG 3 A X2 it is possible to use a second curve as a dither amplitude source for overlaying the main current curve with a dither. This mode uses the curve as a data source for the dither amplitude. The device parameter “dither-Type” and “dither-frequency” remain active.



example of a possible current curve

Contents

1 Introduction

1.1 General

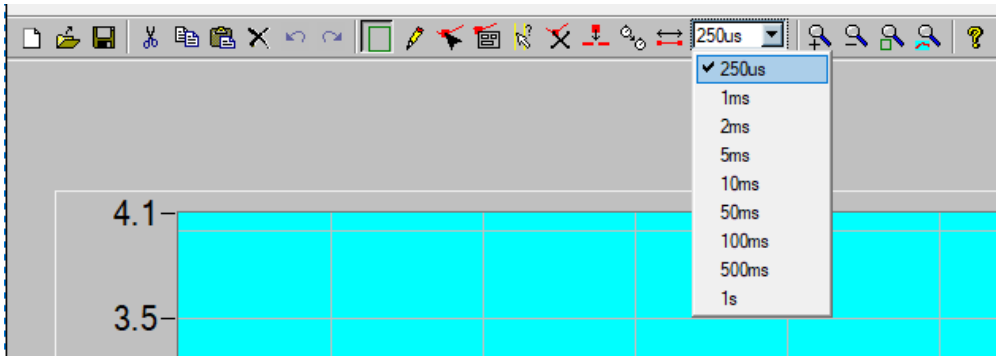
The ***SRG 3 A X2*** is able to save an arbitrary waveform. This waveform is used as the set-current if „Current Curve 12“ is selected. This curve is set up with the pc-software „SRG3X Curvegenerator“ and transmitted to the ***SRG 3 A X2*** via RS-232.

The curve can be generated in a graphical manner or imported from a text-based table.

It is possible to define up to 30000 curve-points.

From Version 1.2 of the curve generator pc-software and software version V2.10 of the ***SRG 3 A X2*** it is possible to use a second curve as a dither amplitude source for overlaying the main current curve with a dither. The device parameter “dither-Type” and “dither-frequency” remain active. The set dither amplitude is generated from the curve and displayed in the parameter-menue as “dither amplitude”.

1.2 Curve time-base



The time-base of the curve can be set between 250 microseconds and 1 second.
Using a current ramp, the time-base should be set as low as possible to generate a smooth rise/fall without steps. When generating a constant current, the time-base should be set as big as possible to save memory space. The memory usage is displayed in % right next to the curve.

1.3 Dither-amplitde-curve

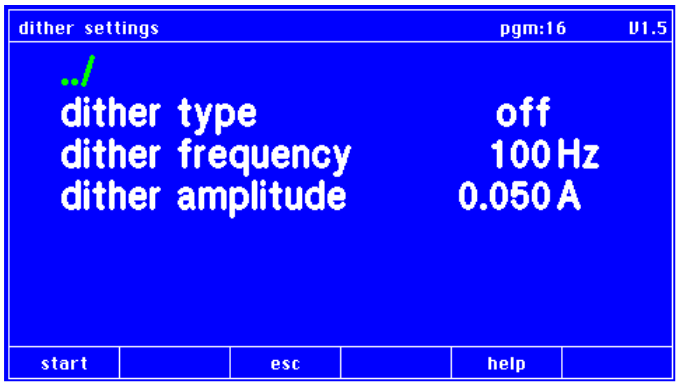
(new from December 2021, with SRG 3 A X" software version 2.10 and newer)

In the ***SRG 3 A X2*** for every current curve, it is possible to set an additional fixed dither signal.

Using the Current Curve 12, for every point of the basic current curve an associated dither amplitude can be set via the dither amplitude curve. The dither amplitude curve is set up the same way as the current curve, either via the graphical tools or imported from a text-based table file.

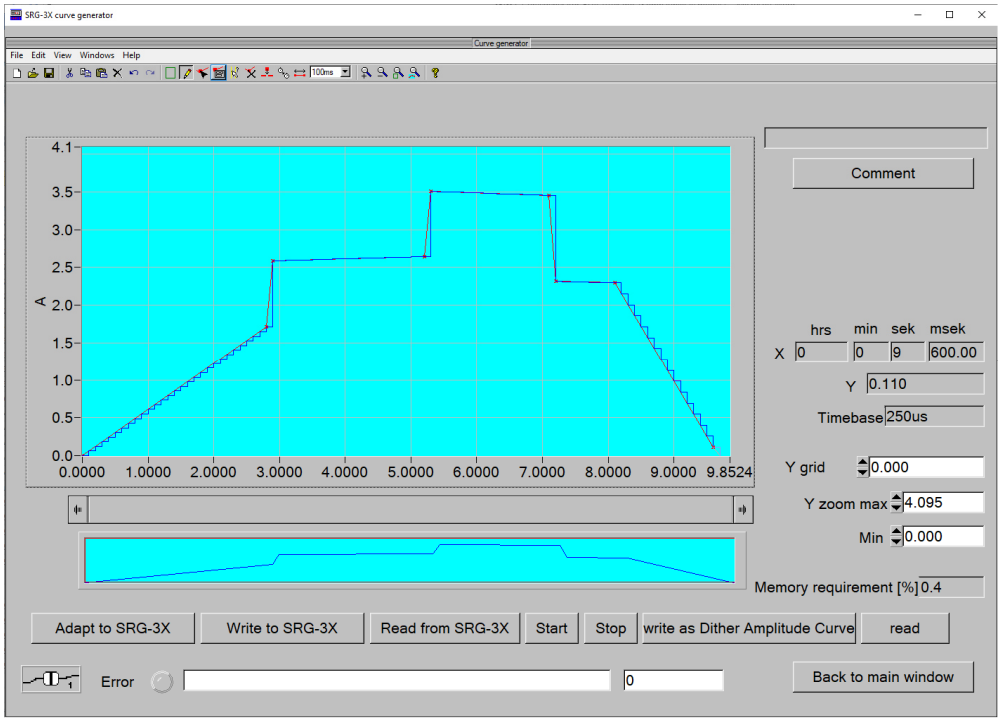
If the Dither-Type is set to "off", the dither amplitude curve is unused and no dither is generated at all. It is not necessary to have a valid dither amplitude curve programmed to the ***SRG 3 A X2.***

If a Dither-Type other than "off" is selected, a valid dither-amplitude-curve has to be programmed to the ***SRG 3 A X2.*** , otherwise a correcponding error message is diaplayed.



Parameter-menue „dither settings" of the SRG 3 A X2

If using the current curve 12 (curve generator) together with a dither, the parameter "dither amplitude" is updated with the momentarily set dither amplitude in practically realtime.



button	function	comment	
„*Write to SRG-3X*“	Created curve is written to the SRG 3 A X2 as current curve	unchanged	
„*Read from SRG-3X*“	Current curve saved in the SRG 3 A X2 is read and displayed	unchanged	
„write as Dither Amplitude curve“	Created curve is written to the SRG 3 A X2 as dither amplitude curve	New from V1.2	
“Adapt to SRG-3X”	The configuration of the connected SRG 3 A X2 is read and the set current range is set accordingly (0-4A or 0-6A)		
“Start”	Testing is started		
“Stop”	Testing is stopped		
„read“ (as dither amplitude curve)	Dither Amplitude curve saved in the SRG 3 A X2 is read and displayed	New from V1.2	

1.3.1 Dither amplitude curve duration

If the duration of the dither amplitude curve is longer than the current curve, the dither curve is quit tohetzer with the current curve and the rest of the dither amplitude curve is unused. If the current curve is longer than the dither amplitude curve, the last value of the dither amplitude curve is unsed until the current curve is finished.

2 Programming examplt

As an overview of the ***SRG3X_Curvegenerator***, it is first showen an example of how to setup and transfere a curve to the ***SRG 3 A X2***.

2.1 Serial Connection

The ***SRG 3 A X2*** is connected the the serial port of a pc via an Crossover-cable (TX and RX signals crossed)

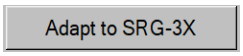
2.2 COM-Settings

- Start the PC-Program ***SRG3X_Curvegenerator***.
- Click on the button 

at the main window.
- Enter the device-address of the ***SRG 3 A X2*** as address. The device-address of the ***SRG 3 A X2*** can be viewed and changed as menue point „RS-232 address“ in the “common settings” submenue
- The “RS232 baudrate” of the ***SRG 3 A X2*** has to be set to **9600 Baud**. Other baudrates are currently not supported by the ***SRG3X_Curvegenerator***.
- Set the comport number to the COM-Port of the pc used.
- Press the Button „Read ID“. If the ***SRG 3 A X2*** is connected propperly, the text box below displays the device identification string, e.G. „IBT-SRG3AX2a-V2.15“

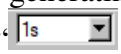
2.3 SRG3AX1 compatibility mode

Set the parameter “SRG3AX1 compatibility mode” of the menue “common settings” to “on”. This sets the current range of the curve generator to 0-4A. This way, existing current curves used for the predecessor SRG 3 A X1 device can be used without change. If the full current range (0-6A) of the SRG 3 A X2 should be used, the compatibility-mode hast to be disabled. Leave it enabled for this example.

Press the botton 

in order to set the pc programm to the current range of the SRG 3 A X2.

2.4 Creating a curve

- To setup a curve, go to the window “curve generator” vie the menue “Windows”
- Set the view to „Lines + Steps“ via the menue “View” and the submenue “display types of curves”
- For the example, we are generating a rectangle with 1 second activity and 1 second pause
- Set the time base to „1s“ 

(1 second).
- To ease setting the current to round values, we set the grid in the y-direction to 1.000A:


- On the x-axis, the time is displayed in seconds. Use the  button until a total time of about 10 seconds is display.
- Secect the draw-point-tool  .
- Clicking and holding with the left mouse button to the graphic window will create a new curve point, which can be moved. Releasing the mouse button will set the curve point to the current location. Set one point to 3A / 1s and another to 0A / 2Sek.

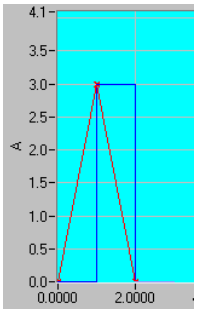


Fig. 1: Rectangle impulse

- To copy and reuse the **Rectangle impulse** click on the select tool  und select the entire curve.

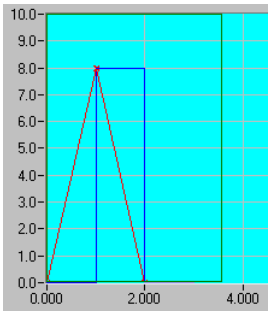


Fig. 2: selected area

- Press the Copy-Button  or press Ctrl+C to copy the selected area.
- Use the selection tool  again to select the area behind the existing curve
- Paste the copied curve to the selected area using  oder Ctrl+V.
- Be aware of the limitations of coping curve parts described in **5.12** „Block operations”.
- Repeat the above procedure again three times to get a total of 5 rectangle impulses.

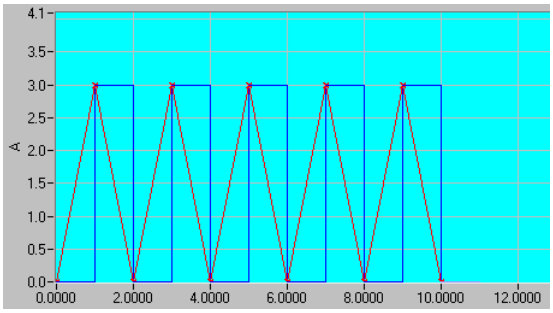


Abb. 3: 5 duplicated recatangle-impulses

- Be aware of the last, lighter coloured curve part between second 10 and 11. It is automatically created to connect the last curve point to the first. This is necessary to be able to execute the curve multiple times.
- In this specific case, a pause of 2 instead of 1 second is generated after the fith impulse. To correct this: Select the delete-tool  and click on the last curve point to delete it.

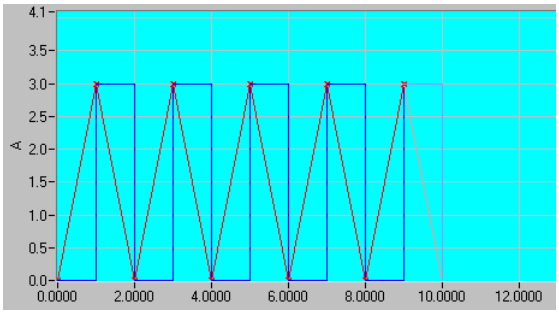


Abb. 4 5 duplicated recatangle-impulses with corrected pause

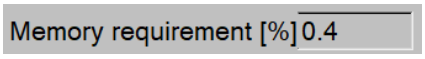
- Note the connection of the last curve point at 3 A to the first at 0 A created automatically.

- The number of executions oft he curve iss et with the parameter “cycles”, like using any other current curve od the ***SRG 3 A X2***. The parameter „cycles“ can be set via the „***SRG3XSteuerung***“ pc program or vie the keyboard and display of the ***SRG 3 A X2***.
  Set the cycle-count to 3 for the purpose of this example.

- Press the button 

and enter a description of the curve, e.G. „test-curve 1“.
- Save the curve to a file via „File / Save curves as“.

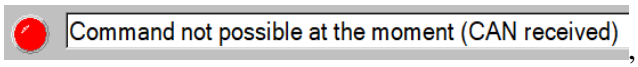
2.5 Transmitting and testing the curve

- The text box 

shows the percentage of ***SRG 3 A X2*** memory occupied by the curve currently displayed.

- Transmit the curve to the SRG 3 A X2 via the button 

.

- If you get the following error message 

, the ***SRG 3 A X2*** is busy because the testing is active and not able to receive a new curve at the moment. Stop the Testing with the stop-button 

or with the Start/Stop-Button at the SRG 3 A X2. Now the curve can be transmitted to the ***SRG 3 A X2***.

- For the ***SRG 3 A X2*** to output the transmitted curve, the parameter "current curve" has to be set to 12. Set the parameter "Dither type" to off (no dither generated).

- To Start testing press the Start-Button 

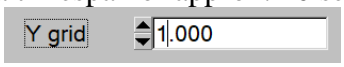
or use the Start/Stop-button of the SRG 3 A X2.

- The set current now switches between 0 and 3 Ampere for 15 times (3 cycles with 5 pulses each).

2.6 Saving the Curve

- Via the Menue *File / save curve* the curve can be saved on the pc as a file.

2.7 Creating another curve

- To explaint further functions of the ***SRG3X_Curvegenerator***, we are creating a second curve.
- Delete the existing curve with  or via the menue point *File / New* and click again on the Zoom out Button  until a timespan of approx. 10 seconds is displayed.
- Set the y-Grid again to 1A: 

- Set the timebase to 100 Milliseconds this time 

- Use the draw-tool  to draw a line to 2A/5seconds and another to 2V/10seconds (In the bexes right next to the graphic-window, the coordinats of the drawing position are displayed).

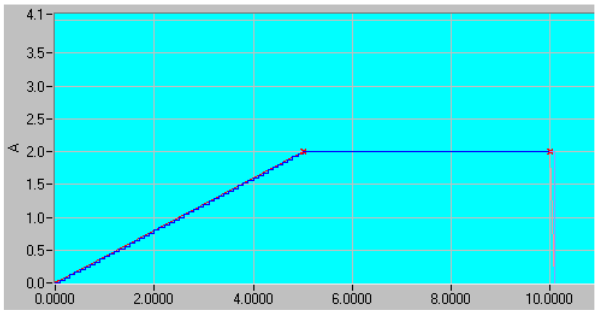


Fig. 5

- Are you sure you got the right curve points? Use the Show/Change coordinates tool and click on a curve point.
- Now a window is displayed for you to verify and if necessary change the coordinates of the selected curve point.
- Let's now look at the effect of the selected time base. Click on and then click on the slanted line. A menu appears in which you can change the time base of the curve section you clicked on. Select “1s”. You can see that the steps used to form the slope become much coarser. This is because a new curve value is now only calculated and output every second.
- Now change the time base of the slope to “10 ms”. The steps are even finer than in the “100 ms” setting.
- Please note that the storage space requirement Memory requirement [%] 1.9 increases if you choose a smaller time base.
- We will now add a current dip.
- Increase the curve range from 6 to 8 seconds by selecting and dragging a marquee from 6 to 8 seconds. Then click to enlarge the selected area.
- Now add four new points to the line by selecting and clicking on the line at four different points.

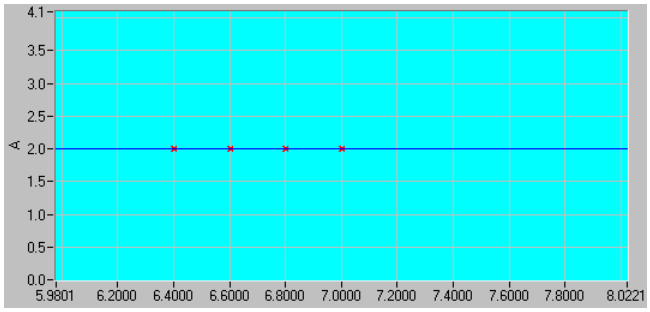


Fig. 6: straight line with four new points

- Now select and drag the points with the mouse to their new positions to simulate a current dip to 0 A in the range of 6.5 to 7 seconds.

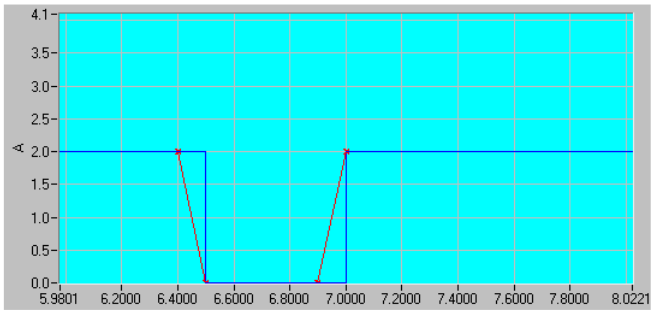


Fig. 7: dip to 0 A

- Use  to show the entire curve again.

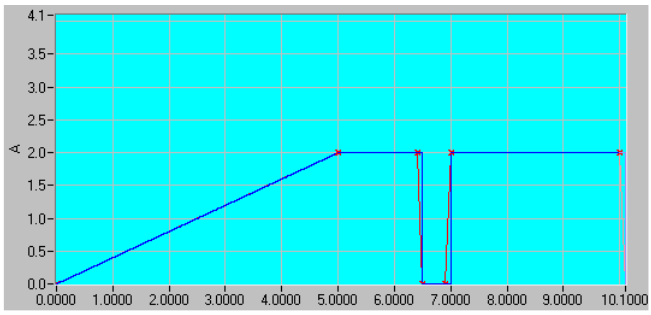


Fig. 8: the entire curve generated

- Assuming the curve should be exactly 10 seconds long. Then it is 100ms too long due to the automatically inserted last curve section. So change the length of the straight line that goes from 7 to 10 seconds from 3 to 2,900 seconds. To do this, select  and click on the straight line. In the window that now appears you can change the curve length.
- Try the button  . This allows you to display the time bases used. A vertical yellow line indicates that the time base changes at this point.
- If you want, enter a description of the curve using the button 

and then save the curves with the save icon  or with “File / Save curves”.

2.8 Transmitting the curve

- As above, you can transfer the curve to the SRG 3 A X2 using 

.
- Please note that transferring a curve will delete the curve previously saved in the SRG 3 A X2.

3 Main Window

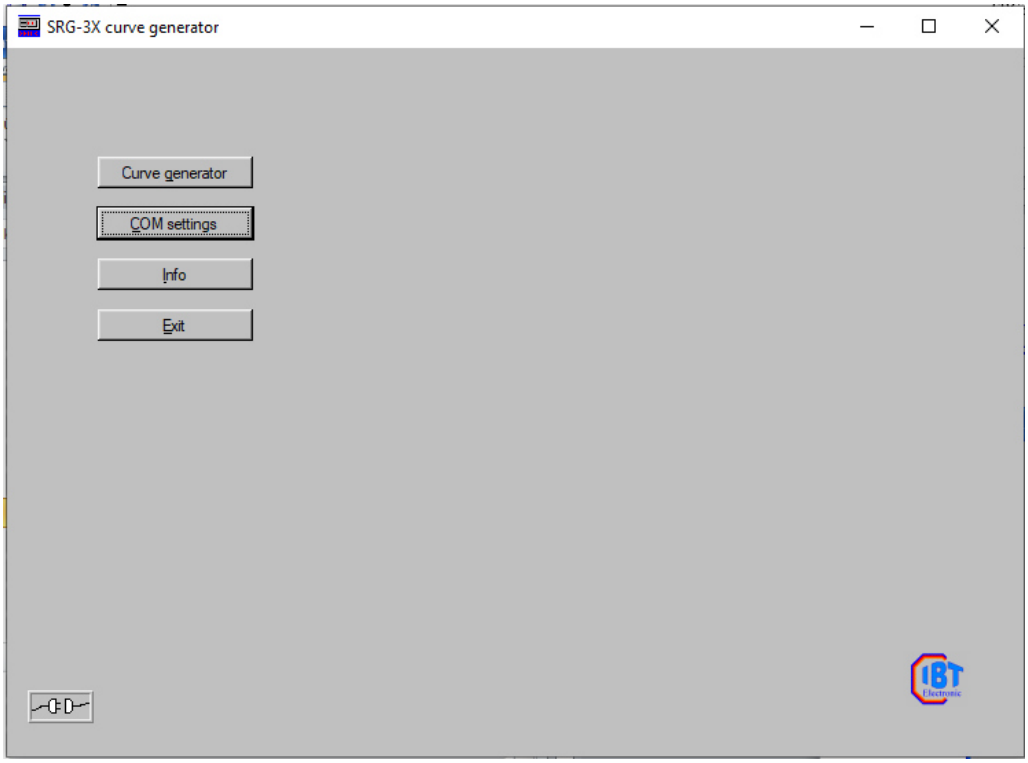


Fig. 9: Main Window

Using the main window, you can access the functions of the ***SRG3X_Curvegenerator***.

3.1 COM settings

The serial connection from the PC to the ***SRG 3 A X2*** can be configured in the COM settings window. The status information from the ***SRG 3 A X2*** can also be read out here.

3.2 Curve generator

Used to generate and transmit curves to the ***SRG 3 A X2***

3.3 Info

Shows the Software Version of ***SRG3X_Curvegenerator***.

3.4 Exit

Quits ***SRG3X_Curvegenerator***

4 COM settings

The settings for the serial port are accessed using the “COM Settings” button in the main window.

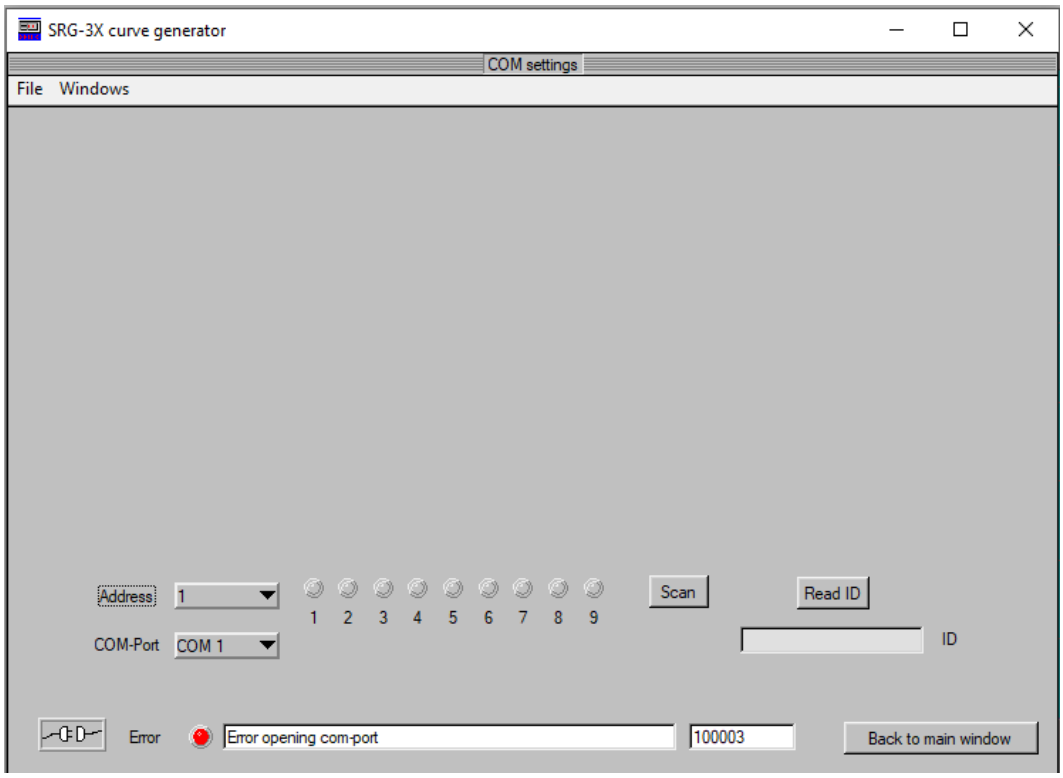


Fig. 10: COM settings

4.1 Transmission cable

PC and ***SRG 3 A X2*** are connected using a Crossover-Cable.

PC	**SRG 3 A X2**
9-pin SUB-D-Female	9-pin SUB-D-Femal
Pin 2 (RD)	Pin 2 (RD)
Pin 3 (TD)	Pin 3 (TD)
Pin 5 (SG)	Pin 5 (SG)

4.2 Configuring the serial port

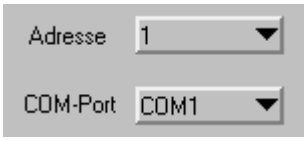
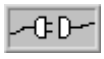


Fig. 11: COM-Port settings

Adress:
Die device address of the ***SRG 3 A X2***, as configured there.

COM-Port:
The serial port number of the PC to which the ***SRG 3 A X2*** is connected.

Baud rate:
The baud rate in ***SRG3X_Curvegenerator*** is currently set to 9600 baud. Check the setting on the ***SRG 3 A X2*** and change it if necessary.

The last selected serial interface can be quickly opened and closed using the  icon at the bottom left of the screen. This icon is also found on most other windows.

4.3 Error display

Fig. 12: error display

The error display consists of a red error LED, an error message and an error number.

The error display only shows those errors that affect the serial communication between the PC and ***SRG 3 A X2***.

4.4 Read Device ID

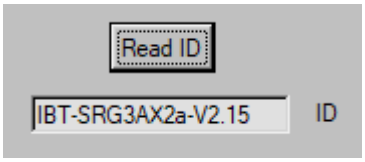


Fig. 13

The device name and software version of the ***SRG 3 A X2*** can be queried and displayed here.

4.5 Scan

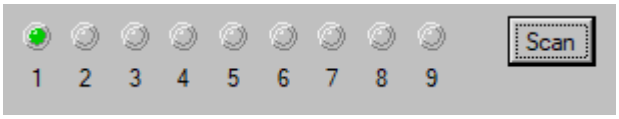


Fig. 14

Here the serial interface can be searched for ***SRG 3 A X2*** devices. The device address of a found device is symbolized by LEDs.

LED gray: No device found
LED green: ***SRG 3 A X2*** found
LED red: Device has responded, but it is not an ***SRG 3 A X2***

5 Curve Generator

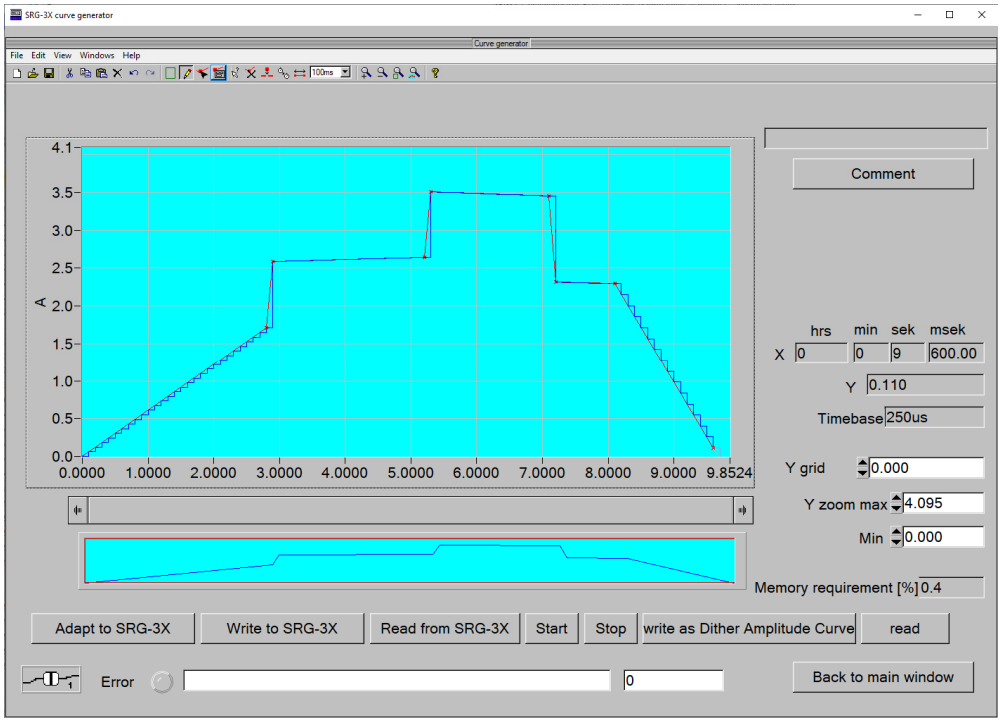


Fig. 15: Curve Generator

Curve shapes are created in the curve generator window and transferred to the ***SRG 3 A X2***.

Curves consist of individual straight lines. A separate time base value can be set for each straight line.
Within the device, each straight line is broken down into individual points and saved. If a curve is read back by the ***SRG 3 A X2***, the information about which straight lines a curve was originally composed of is lost - the entire curve then consists of a sequence of individual points. When saving a curve to a file on the PC, the information about the straight line sections is retained.

5.1 The “last straight section”

At the end, each curve is automatically supplemented by an additional straight line. This straight line serves to connect the end of the curve with the beginning of the curve, since for cyclical processing of the curves it is absolutely necessary that the end of the curve merges back into the beginning of the curve.

The only editing option for the last section of the line is “Change Time Base”.

5.2 Number of cycles

How often the curve should be output one after the other is determined by the “test cycles” parameter, which is also present in all other current curves.

You can reach the “Test cycles” setting with ***SRG3X_Steuerung*** or via the ***SRG 3 A X2*** keyboard in the set parameter menue.

5.3 Storage requirements

The field 

shows what percentage of the ***SRG 3 A X2*** memory is occupied by the current curve. If the memory requirement increases above 100%, the curves cannot be transferred to the ***SRG 3 A X2***.

Even if only a small amout of storage is occupied by a curve, it is not possible to save more than one current and one dither amplitude curve in the ***SRG 3 A X2.*** Every new transmission of a current curve overwrites the old current curve; every new transmission of a dither amplitude curve overwrites the old dither amplitude curve.

If the ***SRG 3 A X2*** is restarted or switched off for a longer time, this has no effect on the stored curves, they remain stored and can be used again.

5.4 Comments

The button 

opens a window in which any comment can be written to describe the curve shape.

The field above the comment button shows the first line of the comment.

5.5 Curve presentation

5.5.1 Diagram

The curve is displayed in a diagram. The Y axis shows the current in A. The unit in the X direction is the time in seconds.
The small diagram below the main diagram always shows the curve in full length, even if the main diagram has been zoomed in.

5.5.2 Lines or steps

In the *View/Display Types of curves* Display menu you can set whether the curves should be displayed with lines, steps or both.

Lines: Every straight line is represented by a straight line.
Steps: Each section of the line is displayed as it is actually output by the ***SRG 3 A X2***. The digitization levels (depending on the time base) can also be seen here. Disadvantage: the graphics take longer to build.

Attention: The above description only applies if the “waveform generator interpolation” parameter in the ***SRG 3 A X2***, which can be found under “Common settings”, is set to “Off”.
If this parameter is set to “On”, then the ***SRG 3 A X2*** internally generates intermediate steps every 250us. This means that all straight lines are output by the ***SRG 3 A X2*** without significant digitization levels, even when using a large time base. By using this function, the storage space

required for a curve can be significantly reduced without obtaining a worse result. The gradient displayed as “steps” is then no longer correct, but the output almost corresponds to the “lines”.

5.6 Zooming

A curve can be enlarged in the X direction with the button and reduced with .

If the “Selection” editing tool is active, a part of the curve can be marked with the mouse (green frame) and the curve can then be enlarged to the marked area .
The button adjusts the zoom level so that the entire curve fits into the diagram.

For zooming in the Y direction, see 5.9 „Y Zoom“.

5.7 Time base

A time base 100ms can be selected in the toolbar. If a new point is drawn (see 5.10.2 “Draw point”) the new line section receives the time base selected here.
The time base determines the time intervals at which a curve is processed. With a time base of e.g. 100ms, curve sections with a length of 100ms, 200ms, 300ms etc. can be drawn, and an oblique straight line has steps at 100ms intervals:

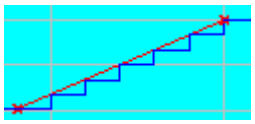


Fig. 16Stages due to the time base

Small time base ->	Smaller times can be realized. Oblique straight lines are resolved more finely. The storage space requirement increases sharply with smaller time bases.
Large time base ->	total length of the curve can be larger. Less storage space required.

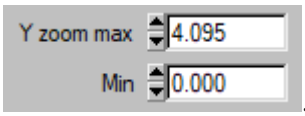
Each section of the line can have a different time base.

5.8 Y grid

In the “Y Grid” Y grid 1.000 field you can set a grid (in amperes) for drawing the points in the Y direction.

Example:
If the value 1 is entered as the Y grid, a point snaps to whole ampere values when drawing and moving.

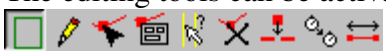
5.9 Y Zooming

The range of the Y axis can be set in the fields 

. This allows a specific area of the curve to be enlarged in the vertical direction.

5.10 Editing tools

The editing tools can be activated by clicking on them in the toolbar.



5.10.1 Select

With the "Select"  tool you can drag a green marking frame around part of the curve with the mouse. The selection can be copied, deleted or zoomed (see Copy, Delete, Zoom commands).

5.10.2 Draw point

With the "Draw point"  tool, a new straight line can be drawn with the mouse at the end of the curve.
The straight line section receives the time base as set in the "Time base" field (see 5.7 "**Time base**"). For drawing see also 5.8 "**Y grid**"

When drawing in a rough time grid, remember the following rule:
The first digitization level after a point is always at the same height as that point.

5.10.3 Move point

The "Move Point"  tool allows you to move an existing point with the mouse.
A point can be moved within the selected Y grid (see **5.8 "**Y grid**"**)).
A point can only be moved if the time bases of the adjacent lines are the same.

5.10.4 Show/change coordinates of point

With the "Show/change coordinates of point"  tool, the coordinates of a point are displayed by clicking on the point. The coordinates can be changed by entering new coordinates.
Coordinates can only be changed on the time axis if both adjacent lines have the same time base.

5.10.5 Show coordinates and time base

If the “Show coordinates and time base” tool is activated, a vertical yellow line is drawn in the curve graphic at every point at which the time base of the curve parts changes. This serves to provide a better overview of the time bases used.
If you hold down the left mouse button in this mode, the coordinates at the current mouse position are displayed in the coordinate field to the right of the graphic.

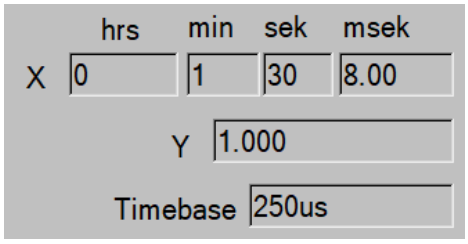


Fig. 17: Display of the point coordinates

5.10.6 Delete point

With the “Delete Point” tool a point can be deleted and the two adjacent line pieces become a single line.
A point can only be resolved if the two adjacent lines have the same time base.
“Dissolve Point” does not change the overall length of the curve.

5.10.7 Divide straight line

The “Split Line” tool inserts a point into an existing line, thereby dividing the line into two new lines.

5.10.8 Change time base

The time base of a straight line can be changed using the “Change time base” tool.
Changing to a smaller time base requires more storage space in the ***SRG 3 A X2***.
The time base can only be changed to a larger value if the line length is divisible by the new time base (example: The time base of a line with a length of 120 ms cannot be changed to 100 ms because the length 120 ms is not expressed in steps of 100 ms can be).

5.10.9 Change length of line

If you click on a straight line with the “Change straight line length” tool, the length of the straight line is displayed. The length can be changed by changing the displayed numerical values. The new length must be divisible by the time unit of the line.

5.11 Redo/Undo

Using the “Undo” and “Redo”  buttons, an editing step can be undone or an undone step can be restored.
A maximum of the last 10 steps can be undone.

5.12 Block operations

With the block operations cut, copy, paste and delete  , a larger curve area is processed in conjunction with the selection tool  .

Since a curve shape must always be continuous, i.e. must not have any gaps or jumps, special problems arise with block operations. Please note the comments in the following subsections.

5.12.1 Delete operation

The selected curve part is deleted using  , the *Edit/Delete* menu or the *Del* key.

Possible continuity problem:
After deleting an area, the last point before the deleted area and the first point after it must merge into a single point. If these two points have different Y values, an illegal jump will occur in the resulting curve after deletion.
Therefore, the Y values of the points are adjusted automatically, which can lead to a change in the previous curve shape.

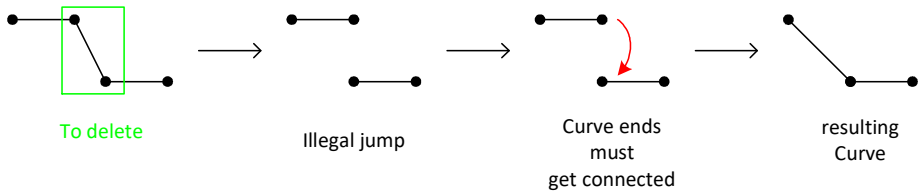


Fig. 18: Problem when deleting a curve section

5.12.2 Copy

Using  , the *Edit/Copy* menu or the *Ctrl+C* key combination, the selected curve part is copied and can be reinserted elsewhere using the “Paste” command.

5.12.3 Paste

Using  , the *Edit/Paste* menu or the *Ctrl+V* key combination, a previously copied curve part is inserted.
The existing curve is divided into two parts at the first point after marking and the previously copied curve part is inserted.
If several points are marked at this point, they will be deleted!

Possibly continuity problem
When inserting, the first and last points of the inserted area must merge with the connection points of the previous curve. If these points have different Y values, an illegal jump will occur in the resulting curve after insertion.
Therefore, the Y values of the points must be adjusted, which can lead to a change in the inserted curve shape.

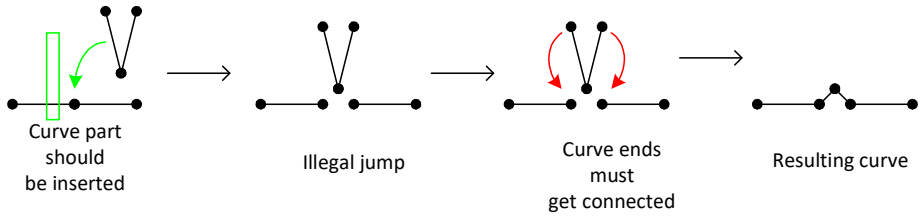


Fig. 19: Problem when inserting a curve section

5.12.4 Ausschneiden

Using  , the *Edit/Cut* menu or the *Ctrl+X* key combination, the selected curve part is copied and then deleted.

Possible continuity problem:
see 5.12.1 “Delete operation”

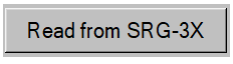
5.13 Sava and open curves

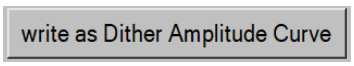
The curve can be saved to a file and reloaded using  or using the commands in the File menu.

5.14 New curve

With  ore the menue command *File/New*, the existing curve is deleted.

5.15 Transmitting to the SRG 3 A X2 device

With  the curve is transferred from the PC to the ***SRG 3 A X2*** as a current curve.
With  you can read out the current curve stored in the ***SRG 3 A X2***.

With  the curve is transferred from the PC to the ***SRG 3 A X2*** as dither amplitude curve. With  you can read out the dither amplitude curve stored in the ***SRG 3 A X2***.

5.16 Prüfung starten/stoppen

Use the buttons  and  to start or end a test on the ***SRG 3 A X2***.

5.17 Attach curves

Under the File menu item, curves can be attached to the curve currently displayed in the editor window. To do this, the curve part to be attached must be saved in the special "SRG-3X" format. If curves are to be attached in text format (see 5.18 "Import/export curves"), the curve in question must first be imported and saved in ***SRG3X -*** format.

5.18 Import/export curves

Curves can be exported and imported as a text file.

Each line in the text file represents a curve point.

Columns:
1st column: time in seconds
2nd column: Y value in percent (based on the maximum value 4.095A / 6.143A).
3rd column: time base, e.g. "100ms"
4th column: curve number (is always 1)

- Separator is the tab character
- Decimal point is "."
- Comments are marked with "#" at the beginning of the line.
- The time must always start with 0 seconds
- The lines must be sorted in time

Example:

0.000	*0.00*	*1sec*	*1*
1.000	*50.00*	*1sec*	*1*
2.000	*0.00*	*1sec*	*1*

→ Data for Curve 1: Output rises from 0 to 50% in 1 second and then drops back to 0% in another second.
With the time unit of 1 second, the increase is represented by a single step.

The end of the curve is again supplemented by ***SRG3X_Curvegenerator*** with a "last straight section".
The following curve results.

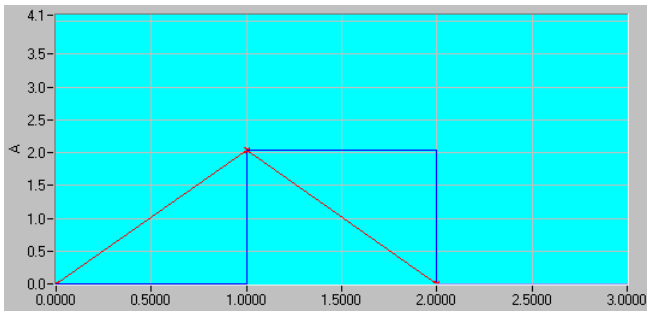


Fig. 20: Example, imported curve

With the import function, complex curve shapes that were created with an external program can be imported into ***SRG3X_Curvegenerator***.

Example sine with MS Excel

A sine should have an amplitude of 80% and an offset of 50%. The curve should consist of 100 points, each 100ms.

- Open Microsoft Excel.
- Enter in cell A1 on the blank sheet:
  =((ROW(A1)-1)*0.1)
  ^
  timebase: 0.1 seconds per step

- Enter in cell B1:
  =(40*(SIN(2*PI()/100*ROW(A1)))+50)
  ^ ^ ^
  Amplitude point count offset
  (80% / 2)

- Enter the time base, we choose 10ms, and the curve number 1 into cells C1 and D1.
- Select cell A1 and drag the small rectangular marker in the lower right corner of the cell with the mouse to row 100.

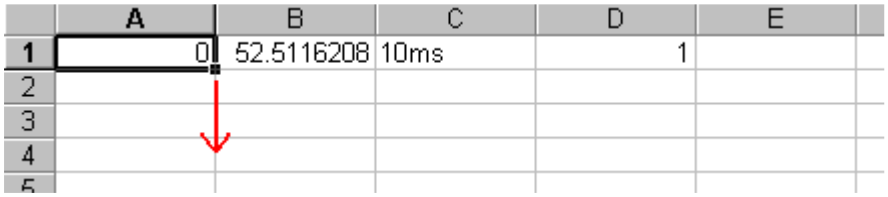


Fig. 16

- Repeat with cells B1, C1 and D1
- Save the values as a text file using the “File”/“Save as” menu item.
- Select “Text (OS/2 or MS-DOS)” as the file type.
- Excel alerts you that the selected file type does not support multi-sheet workbooks. Confirm this with “OK”.
- Open the generated text file with a text editor, e.g. the Windows editor “Notepad” and check whether the decimal point “.” is used. By default, Windows uses the comma “,“.
- If the decimal point is a comma, you can change the behavior of Windows in the Windows Control Panel under Regional Settings. Please note, however, that this change will affect all Windows programs that use this setting. After the decimal point character is changed to point “.”, Excel must save the curve again as a text file.
- Alternatively, if you do not want to change the Windows settings, you can open the text file containing the curves with a text editor (e.g. the Windows editor “Notepad”) and have all commas replaced by periods (with the “Edit / Replace” function).
- You can now import the file saved in this way into ***SRG3X_Curvegenerator***.

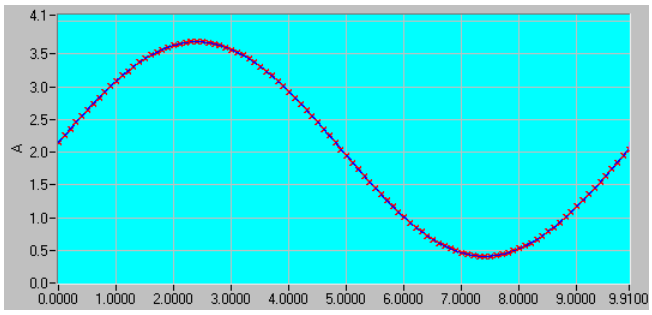


Fig. 17: imported sine-wave

Please note that the Y values of the sine curve do not change suddenly between two points, but are connected by straight lines with a time base of 10ms. If the time base “100ms” had been specified in the table, the sine curve would have coarser steps.

The advantage of the 100ms method is the significantly lower memory requirement because the curve is made up of fewer points.

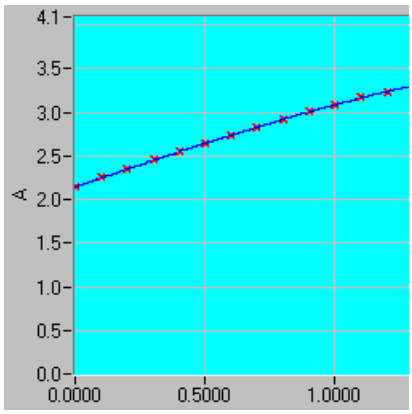


Fig. 18: sine-wave with timebase 10ms

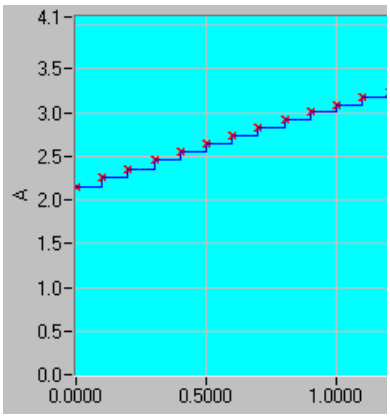


Fig. 19: sine-wave with timebase 100ms

6 Errors

The following lists of error messages do not list all possible errors, but only those that can occur frequently.

6.1 General issues

problem	Possible cause
When editing the curve in ***SRG3X_Curvegenerator***, the insertion does not work correctly.	- Please note that any selected area will be deleted when pasting. - Note that insertion occurs at the first point after the marker or, if there is no marker, at the end of the curve. - Note the problems described under 5.12 „Block operations“.
Graphics take a long time to build	If there are a lot of curve points, the graphic creation can take a long time. Try to reduce this effect by: - Activate View/Display types of Curves/Lines in the menu - Zoom in on the area of the curve that you are currently editing so that the entire curve does not have to be redrawn after an editing step. - Do not use a curve shape read back from the ***SRG 3 A X2***

6.2 RS-232 Problems

Possible Errors in communication between ***SRG3X_Curvegenerator*** and the ***SRG 3 A X2*** device. They are displayed in the error display in ***SRG3X_Curvegenerator***.

Fig. 20: Error message in ***SRG3X_Curvegenerator***

Error message	**Possible cause**
No answer from device	- Power supply not connected. - Serial cable not connected. - Serial cable connected to the wrong COM port on the PC. - Incorrect COM port set in the “COM Settings” window. - Incorrect device address set in the “COM Settings” window. - Incorrect baud rate set on ***SRG 3 A X2***.
Wrong answer from device	- Random transmission error. - Defective RS-232 cable. - RS-232 cable too long. - Interference e.g. caused by power cables near the ***SRG 3 A X2*** or the RS-232 cable.
COM-Port not open	- No serial port was opened in the “COM Settings” window.
Error opening COM-port	- The desired serial port is currently being used by another program. - The PC does not have the desired serial interface.
Command not possible at the moment (CAN received)	- An attempt is made to read or write a curve while a test is running on the ***SRG 3 A X2***. End the test with the “Start/Stop” button.