

# User manual

Welcome to LogarithmPlotter's user manual. Here, we'll cover most features of LogarithmPlotter and how to use them.

[Online version](#)

## Introduction: How LogarithmPlotter works

LogarithmPlotter is a software to create plots and graphs with a [logarithmic scale](#), the most well known kind being [Bode plots](#), which LogarithmPlotter helps create in asymptotic form. While logarithmic scales are the primary interest of LogarithmPlotter, LogarithmPlotter also supports non logarithmic scales, which may be required to use certain features.

To do that, LogarithmPlotter uses a system called Objects, which may seem familiar to you if you have used other plotting software like [Geogebra](#).

An "object" is anything that can be represented on the graph. LogarithmPlotter allows you to create 9 types of objects:

Icon	Type	Works well in logarithmic scale	Works well in non logarithmic scale	Allows pointer positioning	Comment
$\bullet^A$	Points	✓	✓	✓	
I t	Texts	✓	✓	✓	Used as additional labels if necessary
f(x)	Functions	✓	✓	X	
$\omega$	Bode Magnitudes	✓	X	X	
$\varphi$	Bode Phases	✓	X		
X	X Cursors	✓	✓	✓	Cursors on the x-axis
(u <sub>n</sub> )	Sequences	X	✓	X	There are several performance issues on the logarithmic scale related to having to calculate far too many values. You should use functions defined on N as a substitute if possible.
$\leftarrow$	Distributions	✓	✓	X	

LogarithmPlotter will also create its own objects automatically when needed (for example, the sums of the bode gains and phases).

## The Interface

### First start



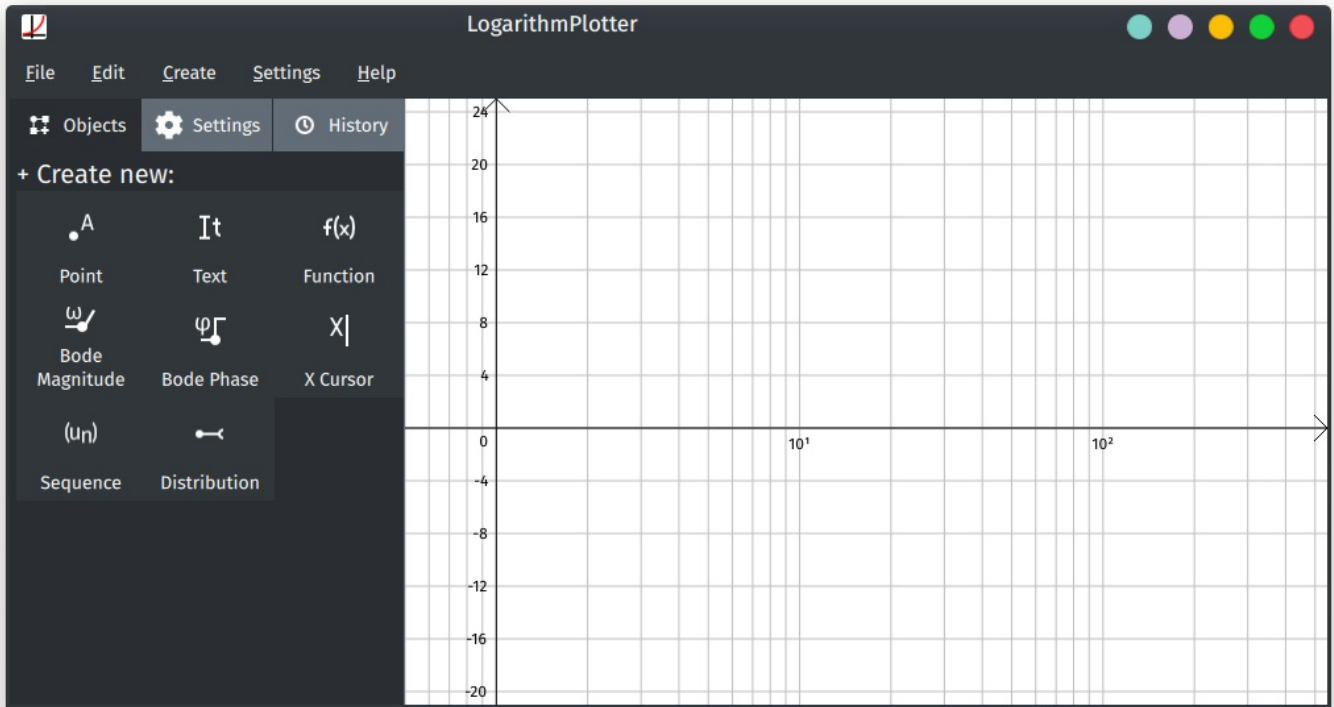
When LogarithmPlotter starts for the first time or when it's been updated, you will be greeted by a screen similar to this one. It allows you to see the changelog, as well as configure the global options of LogarithmPlotter.

- "Check for updates on startup" does exactly what it sounds like. If enabled, LogarithmPlotter will check if a new version has been released everytime it starts up.
- "Reset redo start when a new action is added to history": if disabled, if you go to a previous section of the [history](#) and make a change, the more recent

changes in the redo section won't be overwritten.

Note that all of those settings can be changed at any moment from the "Settings" menu at the top of the window.

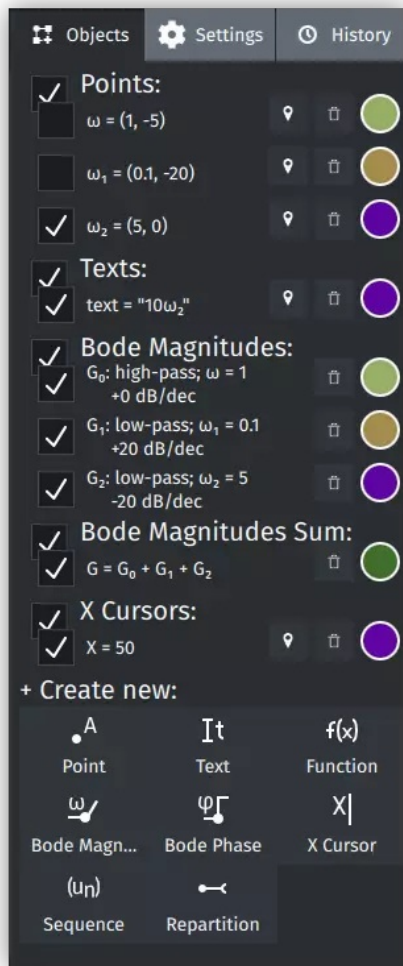
## Overview of the main interface



The main interface of LogarithmPlotter is divided into 2 sections, the side bar on the left, and the graph on the right. The sidebar allows you to modify the diagram and interact with objects while the graph is where you see your changes and objects applied.

The sidebar is composed of 3 tabs: Objects, Settings and History each of which will be explained in sections below.

### Objects tab





The Object tab allows you to interact, create and delete with the objects of the graph. It is composed of two parts, the objects lists, and the object creation grid.

To create an object, you can click one of the buttons at the bottom of the tab, and it will open a [object property editor](#) for that object.

You can reopen it at any time by clicking on the row associated with the object you want to edit.

On that row, you can:

- Show or hide the object, by clicking the  checkbox at the beginning.
- (On objects that can be repositionned) Reposition the object by clicking on the  button.
- Delete the object using the  button.
- Change the color of the object by clicking on the colored circle at the end of the line.


## Settings tab



The Settings tab allows you to change how the diagram looks, and parameter the axes properly. It also features a few buttons you can also find in the menu bar.

List of settings:

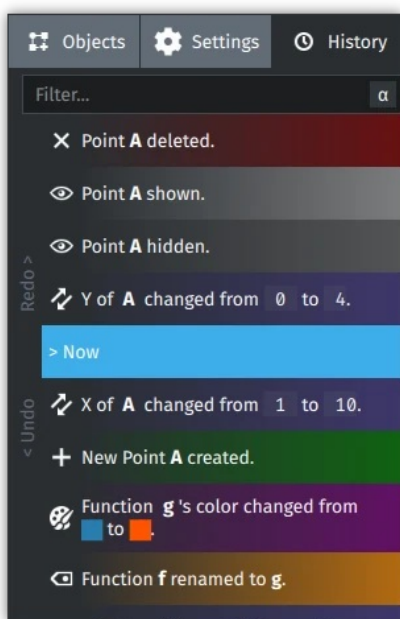
Icon	Name	Default value	Definition
	X Zoom	100	The zoom alongside the x-axis. <ul style="list-style-type: none"> <li>For non logarithmic scales, the number of pixels for a unit of 1.</li> <li>For logarithmic scales, represent one decade divided by 2.3.</li> </ul>
	Y Zoom	10	The zoom alongside the ordinate, equivalent to the number of pixels for a unit of 1.
	Min X	0.5	Minimum value to be drawn on the x-axis. In other words, it's the value of x on the left side of the graph.
	Max Y	25	Maximum value to be drawn on the y-axis. In other words, it's the value of y at the bottom of the graph.
	Max X	Variable	Minimum value to be drawn on the x-axis. In other words, it's the value of x on the right side of the graph. <ul style="list-style-type: none"> <li>This value is dynamic depending on the width of the LogarithmPlotter window as well as the x zoom you've chosen.</li> <li>Setting this value will change the value of the x zoom to fit exactly to the specified dimensions.</li> </ul>
	Min Y	Variable	Maximum value to be drawn on the y-axis. In other words, it's the value of y at the top of the graph. <ul style="list-style-type: none"> <li>This value is dynamic depending on the height of the LogarithmPlotter window as well as the y zoom you've chosen.</li> <li>Setting this value will change the value of the y zoom to fit exactly to the specified dimensions.</li> </ul>
	X Axis Step	4	Step of the graduation for the x-axis. <ul style="list-style-type: none"> <li>Only for non logarithmic scale.</li> <li>This value is an expression, you can use pi or e in it.</li> </ul>
	Y Axis Step	4	Step of the graduation for the y-axis. <ul style="list-style-type: none"> <li>This value is an expression, you can use pi or e in it.</li> </ul>
	Line width	1	Width (percentage) of the the lines and circles of objects shown on the graph. <ul style="list-style-type: none"> <li>For lines, it's directly the width of the line.</li> <li>For circles, the diameters are <math>8 + 2 \times \text{line width}</math>.</li> </ul>
	Text size (px)	14	Size in pixel of the text shown on the graph.
	X Label	Empty	Label to be used on the x-axis. <ul style="list-style-type: none"> <li>Example: "x", "<math>\omega</math> (rad/s)"...</li> <li>Editable, you can put any value you want, while maintaining an history of the previously used labels.</li> <li>Note: this history is not saved with the file.</li> </ul>
	Y Label	Empty	Label to be used on the y-axis.

 Y Label	Empty	<ul style="list-style-type: none"> <li>• Example: "y", "Magnitude (dB)", "<math>\varphi</math> (<math>^{\circ}</math>)", "<math>\varphi</math> (rad)", "<math>\varphi</math> (deg)"...</li> <li>• Editable, you can put any value you want, while maintaining an history of the previously used labels.</li> <li>• Note: this history is not saved with the file.</li> </ul>
X Log Scale	<input checked="" type="checkbox"/>	When checked, the x-axis is represented with a logarithmic scale, otherwise, it's represented with a non logarithmic scale.
Show X graduation	<input checked="" type="checkbox"/>	When checked, will show the labels alongside the x-axis ( $10^1$ , $10^2$ , ... or 4, 8, ...). Otherwise, they will be hidden.
Show Y graduation	<input checked="" type="checkbox"/>	When checked, will show the labels alongside the y-axis (0, 4, ...). Otherwise, they will be hidden.

List of the buttons:

- Copy to clipboard:
  - Copies an image of the graph to the clipboard.
- Save plot:
  - Saves the plot in the currently opened file, or prompts you to pick a location if non are open...
- Save plot as:
  - Prompts you to choose a location to save the plot at, and saves it.
- Load plot/Open plot:
  - Prompts you to choose an existing LogarithmPlotter diagram file and opens it in the current window.
  - **IMPORTANT:** All unsaved changes to the previous diagram WILL BE LOST if you open a new one.

## History tab



The history tab allows you to see the historical progression of graph broken down in "actions" pertaining to objects. The list in itself is read from top to bottom, from most recent to most ancient.

The "Now" represents the point in history in which the graph is.

Any action that happened before now are in the "Undo" section of the history, under the "Now". Similarly, the actions that happened after the now are in the "Redo" section, above the "Now".

**Note:** You can hover the actions with your mouse to see more details about them.

If you want to undo/redo any action, click on it and it will undo/redo it after undoing/redoing the action in between them and the now.

There exists 7 types of actions:

Symbol	Type	Occurance	Color (Light Dark theme)
+	Object creation	When a new object is created	Green
X	Object deletion	When an existing object is deletion	Red
👁	Show/hide object	When an object's is shown or hidden	Light Grey, Dark Grey
↺	Modify object	When an object's property is changed	Blue, Purple
🏷	Rename object	When an object's name is changed	Orange
🎨	Coloring the object	When an object's color is changed	Purple, Pink

You can also filter the actions of the history by using the "Filter..." search bar.

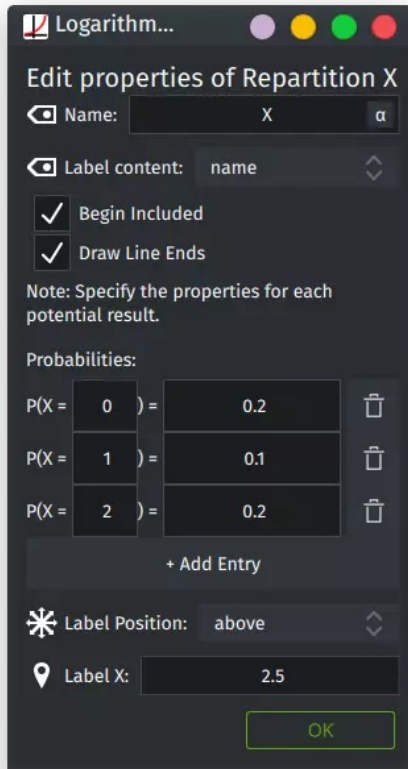
**Note:** The changes in the settings tab are not kept in the history tab. This feature may come to a future version of LogarithmPlotter.

## Editing object properties

### Introduction

Each object (as seen in chapter 0) has properties, which are the core of the customisability of objects. There exists many different kind of properties for different things, like naming objects, the position of points, the expression and domains of functions...

When creating an object, or when clicking on it on the object list, you open the Object Property Editor dialog.



#### Example dialog for a distribution

This dialog contains all of the properties of the object that can be modified. Each property is updated in real time. You can drag the dialog away to see the consequences of your changes on the graph.

That dialog can be closed by either closing the window or clicking the "OK" button. Both these options save all changes done.

### Type of properties

There exists a lot of properties, but each of them are separated in different kinds.

Type	Editor	Example(s)	Comment
Strings	Inline text input	Object name	At the end of the input, the little "α" button allows to enter symbols (greek letters, and indices or subscripts letters and numbers).
Numbers (integers and decimals)	Inline text input	Label position	All inputs other than digits, one optional minus at the start and a dot in the middle are forbidden.
Expressions	Inline text input	Point position, function expression	Like strings, they have the symbol character input dialog. You can use values like e or pi (can also be noted π) in it.
Domains & ranges (sets)	Inline text input	Function domain and range	Use symbolic expressions (e.g $\mathbb{R}^{+}$ will translate to $\mathbb{R}^{+}$ , the strictly positive integer set), ranges (e.g $]0;1[$ ) or even sets (e.g $\{0;3;4\}$ ).
Booleans (true or false)	Checkbox	Show graduation on $\omega_0$ for Bode Magnitude	
Enumerations (set of predefined values)	Combo box	Label position and content, point style, bode pass	
Other objects	Combo box	Bode's $\omega_0$ , X Cursor's target objects.	Contains a list of all objects created in required type, and allows to create a new one if needed. X Cursor target object is an exception as it can target several different types of objects.
Lists (lists of values)	List of inline text inputs	Unused at the moment	Sometimes allows the creation of values, at other the number of values is constant.
Dictionaries (list of values associated with another value)	List of lines having two text inputs separated by text	Sequence expression and default values, distribution default values	Sometimes allows the creation of values, at other the number of values is constant.

There can also be comments and notes in between properties to explain the specialities of certain non intuitive properties.

### Object properties

The following section is a reference for all object properties. It's currently up to date with LogarithmPlotter v0.1.8.

Reference:

- [All objects](#)
- [Points](#)
- [Texts](#)
- [Functions](#)
- [Bode magnitudes](#)
- [Bode magnitudes sum](#)
- [Bode phases](#)
- [Bode phases sum](#)
- [X Cursors](#)
- [Sequences](#)
- [Distributions](#)

### For all objects

Icon	Property	Type	Value	Comment
	Name	string	It must not be the same for two objects.	This value represents the object.
	Label content	Enumeration	<ul style="list-style-type: none"> <li>• null: No label</li> <li>• name: Name of the object</li> <li>• name + value: Name of the object and it's value (generally or Label's X position) in "name = value"</li> </ul>	It's generally used with a positioning property (Label position)

### •<sup>A</sup> Points


Icon	Property	Type	Value	Comment
	X	Expression	Default: 1	Position of the point on the x-axis.
	Y	Expression	Default: 0	Position of the point on the y-axis.
	Label position	Enumeration	<ul style="list-style-type: none"> <li>• ↑ Above</li> <li>• ↓ Below</li> <li>• ← Left</li> <li>• → Right</li> <li>• ↖ Above left</li> <li>• ↗ Above right</li> <li>• ↙ Below left</li> <li>• ↘ Below right</li> </ul> Default: ↑ Above	Position of the label relative to the point.
	Point style	Enumeration	<ul style="list-style-type: none"> <li>• •</li> <li>• ×</li> <li>• +</li> </ul> Default: •	Visual style of the point representation.

### It Texts


Icon	Property	Type	Value	Comment
	X	Expression	Default: 1	Position of the text on the x-axis.
	Y	Expression	Default: 0	Position of the text on the y-axis.
	Label position	Enumeration	<ul style="list-style-type: none"> <li>• &gt; &lt; Center</li> <li>• ↑ Top</li> <li>• ↓ Bottom</li> <li>• ← Left</li> <li>• → Right</li> <li>• ↖ Top left</li> <li>• ↗ Top right</li> <li>• ↙ Bottom left</li> <li>• ↘ Bottom right</li> </ul> Default: > < Center	Position of the label relative to the position.
	Content	string	Default: New text	Content of the text item.

### f(x) Functions




Icon	Property	Type	Value	Comment
	Expression	Expression	Default: x	Expression of the function (depending on variable x).
	Domain	Domain	Default: $\mathbb{R}^{**}$	Domain (definition range) of the function.
	Range	Domain	Default: $\mathbb{R}$	Range (destination range) of the function.
			<ul style="list-style-type: none"> <li>• ↑ Above</li> <li>• ↓ Below</li> <li>• ← Left</li> </ul>	

	Label position	Enumeration	<ul style="list-style-type: none"> <li>→ Right</li> <li>↖ Above left</li> <li>↗ Above right</li> <li>↙ Below left</li> <li>↘ Below right</li> </ul>	Position of the label relative to the position.
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Default: ↑ Above

	Display mode	Enumeration	<ul style="list-style-type: none"> <li>Application: name: domain ↔ range x → expression</li> <li>Function: name(x) = expression</li> </ul>	Display style of the function's label.
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Default: Application

	Label's X position	number	Default: 1	Base position for the label of the function based on the specified x-axis position and it's corresponding y-axis of the function.
	Show points	boolean	True or false Default: true	When using a non continuous domain (for example $\mathbb{N}$ , $\mathbb{Z}$ , sets like $\{0;3\}$ ) the function can be displayed using points at the points where the function is defined. Unticking this hides the points.
	Show dashed lines	boolean	True or false Default: true	When using a non continuous domain (for example $\mathbb{N}$ , $\mathbb{Z}$ , sets like $\{0;3\}$ ) the function can be displayed dashed lines between at the points where the function is defined. Unticking this hides the dashed lines.

### Bode Magnitude

Icon	Property	Type	Value	Comment
	$\omega_0$	Point	By default, a newly created point prefixed by $\omega$ in (1,0).	Used as the base for the beginning/end of the transitional side of the bode magnitude as well.
	Pass	Enumeration	<ul style="list-style-type: none"> <li>High</li> <li>Low</li> </ul>	Type of bode magnitude pass used for this this object.
			Default: High	
	Gain	Expression	Default: 20	Amount of decibels per decade used for the bode gain (should be positive for high pass, and negative for low pass).
	Label position	Enumeration	<ul style="list-style-type: none"> <li>↑ Above</li> <li>↓ Below</li> <li>← Left</li> <li>→ Right</li> <li>↖ Above left</li> <li>↗ Above right</li> <li>↙ Below left</li> <li>↘ Below right</li> </ul>	Position of the label relative to the position.
			Default: ↓ Below	
	Label's X position	number	Default: 1	Base position for the label of the function based on the specified x-axis position and it's corresponding y-axis on the function.
	Show graduation on $\omega_0$	boolean	True or false Default: false	When ticked, will show a vertical dashed line on top of the assigned $\omega_0$ .






### Bode Magnitudes Sum

Icon	Property	Type	Value	Comment
	Label position	Enumeration	<ul style="list-style-type: none"> <li>↑ Above</li> <li>↓ Below</li> <li>← Left</li> <li>→ Right</li> <li>↖ Above left</li> <li>↗ Above right</li> <li>↙ Below left</li> <li>↘ Below right</li> </ul>	Position of the label relative to the position.
			Default: ↑ Above	
	Label's X position	number	Default: 1	Base position for the label of the bode magnitude based on the specified x-axis position and it's corresponding y-axis of the bode magnitude.



### Bode Phases

Icon	Property	Type	Value	Comment
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	$\omega_0$	Point	By default, a newly created point prefixed by $\omega$ in (1,0).	Used as the base for the beginning/end of the transitional side of the bode phase as well.
	Phase	Expression	Default: 90	Amount of phase (defined in the unit below) used for the bode phase.
	Unit to use	Enumeration	<ul style="list-style-type: none"> <li>• °</li> <li>• deg</li> <li>• rad</li> </ul> Default: °	Unit of the phase to be used (used for display).
	Label position	Enumeration	<ul style="list-style-type: none"> <li>• ↑ Above</li> <li>• ↓ Below</li> <li>• ← Left</li> <li>• → Right</li> <li>• ↖ Above left</li> <li>• ↗ Above right</li> <li>• ↙ Below left</li> <li>• ↘ Below right</li> </ul> Default: ↓ Below	Position of the label relative to the position.
	Label's X position	number	Default: 1	Base position for the label of the function based on the specified x-axis position and it's corresponding y-axis on the function.

### Bode Phases Sum

Icon	Property	Type	Value	Comment
	Label position	Enumeration	<ul style="list-style-type: none"> <li>• ↑ Above</li> <li>• ↓ Below</li> <li>• ← Left</li> <li>• → Right</li> <li>• ↖ Above left</li> <li>• ↗ Above right</li> <li>• ↙ Below left</li> <li>• ↘ Below right</li> </ul> Default: ↑ Above	Position of the label relative to the position.
	Label's X position	number	Default: 1	Base position for the label of the bode phase based on the specified x-axis position and it's corresponding y-axis of the bode phase.

### X Cursors

Icon	Property	Type	Value	Comment
	X	Expression	Default: 1	Position of the cursor on the x-axis.
	Object to target	Executable object*	Default: no object is selected.	Target object of which to show the value of through the X Cursor. *Executable objects are objects which take values all along the x-axis with a corresponding y-axis value. Functions, bode magnitudes and phases, sequences and distributions qualify as such.
	Label position	Enumeration	<ul style="list-style-type: none"> <li>• ↑ Above</li> <li>• ↓ Below</li> <li>• ← Left</li> <li>• → Right</li> <li>• ↖ Above left</li> <li>• ↗ Above right</li> <li>• ↙ Below left</li> <li>• ↘ Below right</li> </ul> Default: ← Left	Position of the label relative to the position.
	Show approximate value	boolean	True or false Default: true	When ticked, will show an approximate version of the value of the targeted object at a the given x next to the value of the simplified expression.
	Rounding	number	Default: 3	Rounding of the approximate value.
	Display style	Enumeration	<ul style="list-style-type: none"> <li>• - - - -</li> <li>• _____</li> <li>• •••</li> </ul>	Style of the vertical bar of the cursor.

Default:

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- Next to target
- With label
- Hidden

Position of the target's value on the x cursor. When using "Next to target", it will be at the intersection between the target and the cursor vertical bar, while "With label" puts it just below the name of the cursor and it's position.

Default: Next to target



Target's value position Enumeration

## $(u_n)$ Sequences

Icon	Property	Type	Value	Comment
	Show points	boolean	True or false	Sequences are be displayed using points at each integer the points where the sequence is defined. Unticking this hides the points.
	Show dashed lines	boolean	True or false	Sequences are displayed dashed lines between at the points where the sequence is defined. Unticking this hides the dashed lines.
	Default expression	Dictionary (fixed length at 1, key is a number, value an expression)	$var[n+k] = expression$ Default: $var=u, k=1, expression=n$ $u[n+1] = n$	Note: The expression is being defined through the $n$ variable. You can use the array-syntax to access previous value. For example, for the variable $u$ , you can define $u[n+1]$ depending on $u[n]$ or $u[n+2]$ depending on $u[n]$ and $u[n+1]$ for recursive definition.
	Initialisation values	Dictionary (key is a number, value an expression)	$var[k] = expr$ Default: $var=u, k=0, expr=1$ $u[0] = 1$	Note: You need as many initialisation values (which can be added through the "Add entry button" and removed with the trash buttons) as $k$ .
	Label position	Enumeration	<ul style="list-style-type: none"> <li>• ↑ Above</li> <li>• ↓ Below</li> <li>• ← Left</li> <li>• → Right</li> <li>• ↖ Above left</li> <li>• ↗ Above right</li> <li>• ↙ Below left</li> <li>• ↘ Below right</li> </ul>	Position of the label relative to the position.
	Label's X position	number	Default: ← Left Default: 1	Base position for the label of the sequence based on the specified x-axis position (integer) and it's corresponding y-axis of the sequence.

## Distributions

Icon	Property	Type	Value	Comment
	Label position	Enumeration	<ul style="list-style-type: none"> <li>• ↑ Above</li> <li>• ↓ Below</li> <li>• ← Left</li> <li>• → Right</li> <li>• ↖ Above left</li> <li>• ↗ Above right</li> <li>• ↙ Below left</li> <li>• ↘ Below right</li> </ul>	Position of the label relative to the position.

📍 Label's X position number

Probabilities list Dictionary (key is a number, value an number)

Default: ←  
Left

Default: 1 Base position for the label of the distribution based on the specified x-axis position and it's corresponding y-axis of the distribution.

$P(\text{var}=k) = \text{value}$

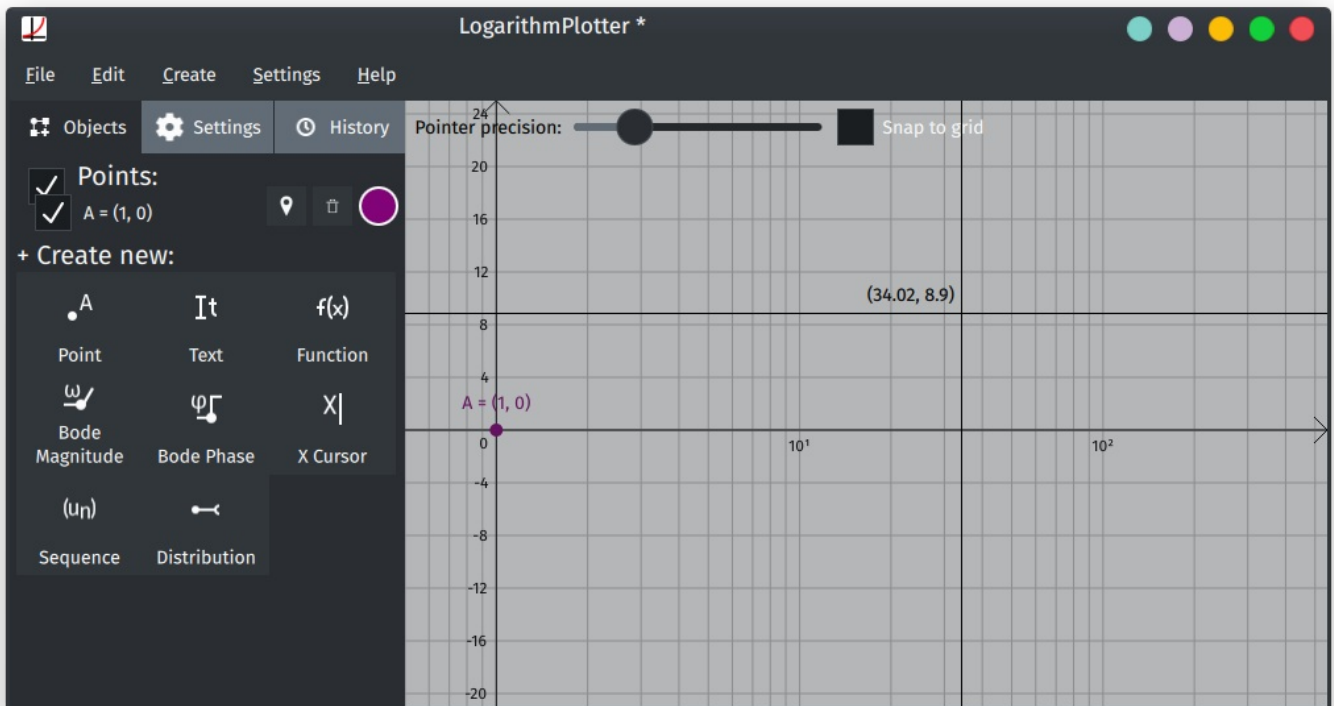
Default: Note: You need as many probabilities as needed (which can be added through the "Add entry button" and removed with the trash buttons) as  $k$ . The displayed graph will be the distribution function.  
 $\text{var}=X, k=0, \text{expr}=1$   
 $P(X=0) = 0$

## Positioning objects

Several objects that rely on position can be placed on the graph with your mouse using the "Positioning" interface. This interface can be accessed using the 📍 button that can be seen on certain object rows.

List of supported objects:

- Points
- Texts
- X Cursors<sup>1</sup>



Click on the desired location to apply it to the selected object.

<sup>1</sup> Note: X Cursor only allow for X positioning so you will only see the vertical bar associated with it.

## Settings

There are two settings available on the interface:

The "Pointer precision" setting allow you to set the amount of digits of precision of the cursor. For example, a pointer with a precision digit of 2 will round all pointed position to 2 digits after the decimal point. Setting a precision to 0 will tound all positions to integers.

The "Snap to grid" checkbox rounds the selected position to the nearest intersection of the grid. It's useful for logarithmic scales when you want to quicly select a rounded logarithmic location at a few hundreds or thousands.