Micro Modules

MicroLight

PC Windows, MAC
V 1.00 / March 2015

**Not suitable for children under the age of 14 !**

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We assume the user is familiar with the general operations of modules. Should this not be the case we highly recommend first thoroughly reading the general part.

The light module "**MicroLight**" offers 18 fully independent, freely programmable light channels.

In order to simulate light bulbs, Xenon lamps or even fluorescent lamps via LEDs, on and off ramps can be defined in addition to the actual lighting pattern (curve). A total of 230 positions are available and each of these positions can be assigned a brightness value of 0-100% in 1% increments. The maximum brightness is adjusted according to the indication of the current between 0 and 100mA in 1.5 mA increments. Otherwise required resistors also become obsolete. Channel 17 and 18 work a bit differently, loads up to 500 mA can be selected per output. The maximum current is set via the common resistor here.

The 3 areas on-ramp, actual curve, and off-ramp can be varied randomly. The curve being edited appears large in the top part of the window. The on-ramp is orange, the curve is green and the off-ramp is purple. The areas can be set randomly by sliding the small triangles under the overall curve.
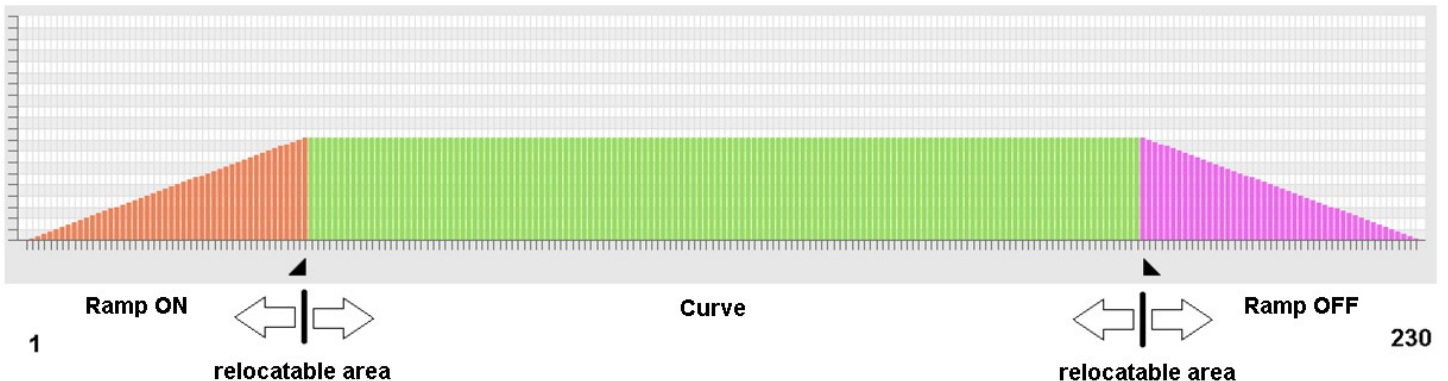

Setting and editing a curve:

In order to edit the parameters of the curve click on the "**Edit curve**" button in the "**Curve**" window, or you can doubleclick the curve.

The overview of all curves is opened. Editing is easiest when the window is enlarged to full screen mode. (either doubleclick the blue bar on top or click the square on the top right)
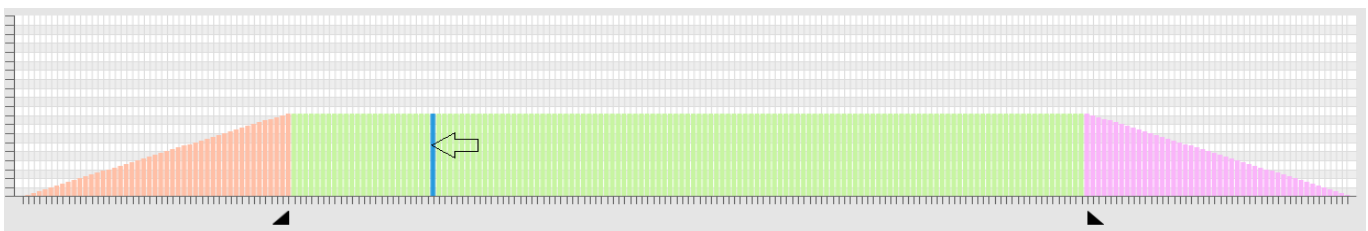

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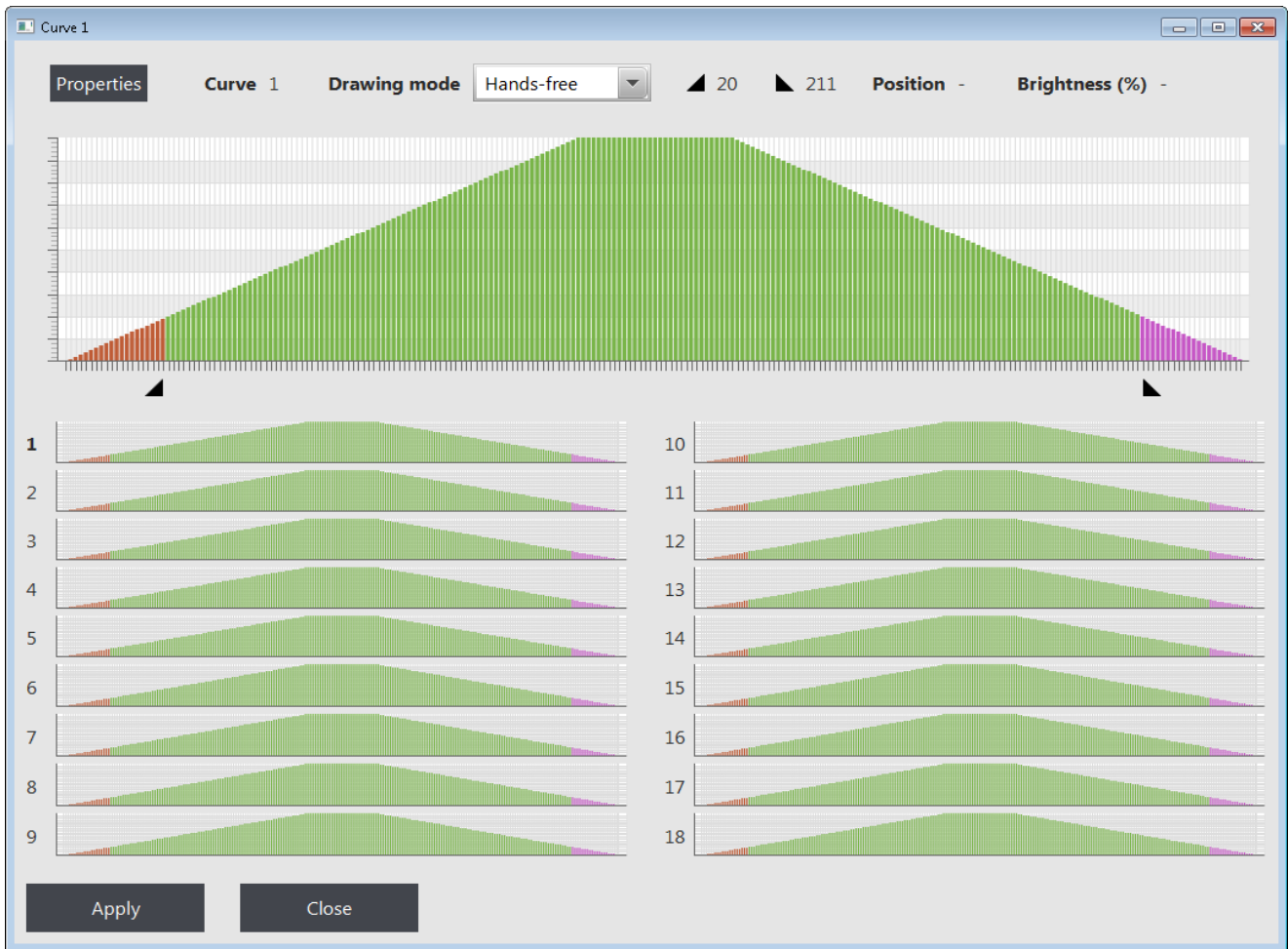
Under the "**Drawing Mode**" button the following possibilities of drawing a curve are available:

An area has to be marked before the "Default Curve" can be altered.


The active area is highlighted blue by pressing the "Shift" key (arrow up) and clicking on both bars between which you wish to edit. You can edit the curve after selecting "Drawing Mode" from the menu on the top left.

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Use the left mouse button to click on the respective bar and slide it upward; you can also create a random curve by holding the mouse button down and sliding to the right or left.
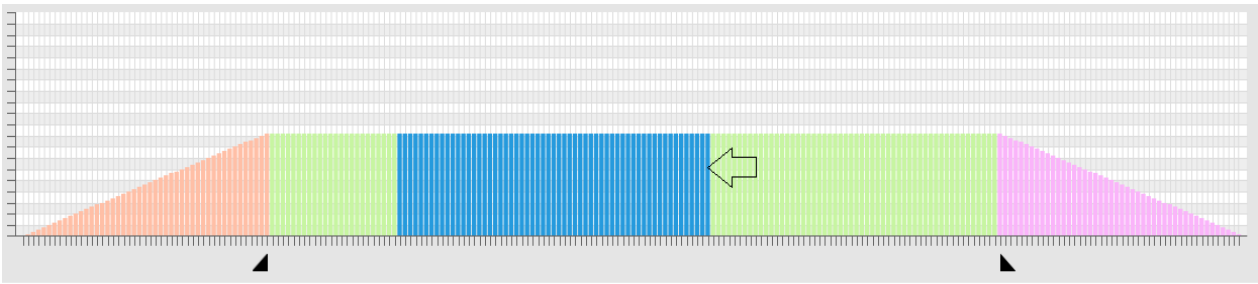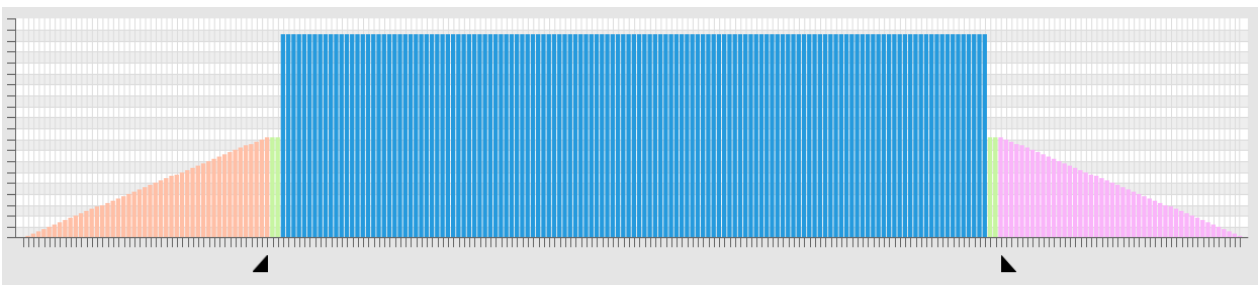

Freehand:
In this mode the curve will follow the tip of the cursor when the left mouse button is pressed. Any shape of curve is possible.
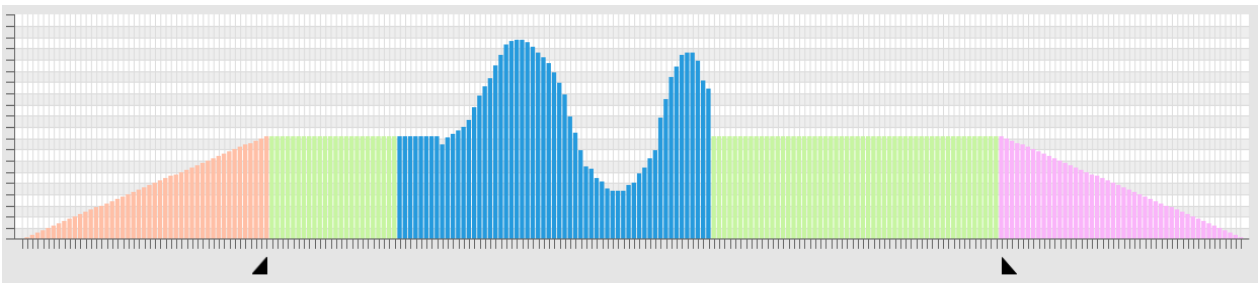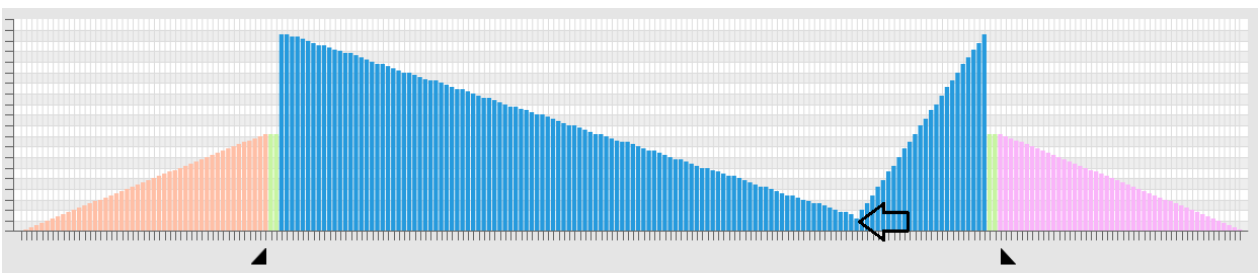

Constant:
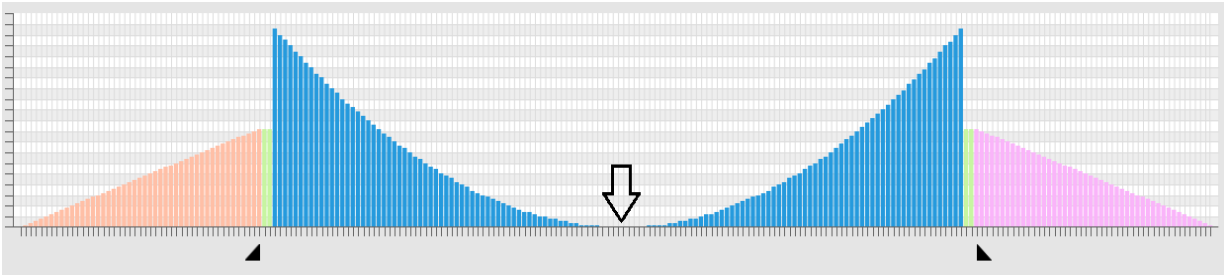All bars follow the cursor at the same height within the highlighted area.

Linear:
The height of the bars follow the cursor like a rubberband within the highlighted area, the terminal points are fixed points.


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Parabola:

The height of the bars follow the cursor like a parabola within the highlighted area, the terminal points are fixed points.

Sigmoid:

The height of the bars follow the cursor like a sigmoid within the highlighted area, the terminal points are fixed points. This shape of curve is especially suitable for the fluctuation of lights.
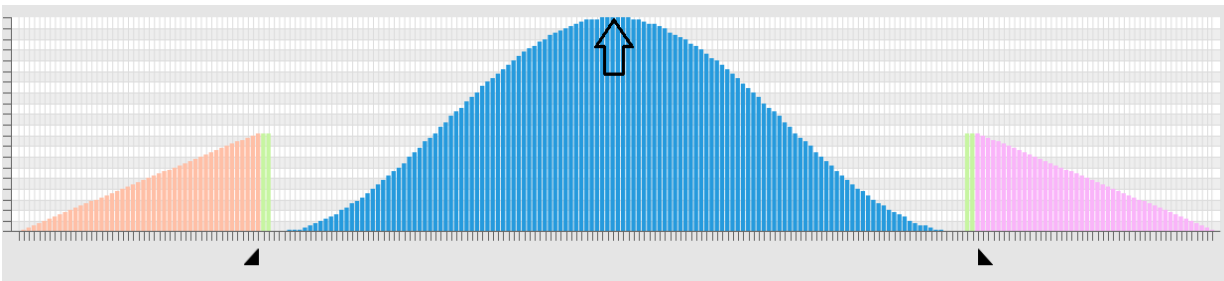
Single Value:

In this mode you can focus on moving one bar at a time. Even when moving across another bar with the cursor, the one selected first always remains active.
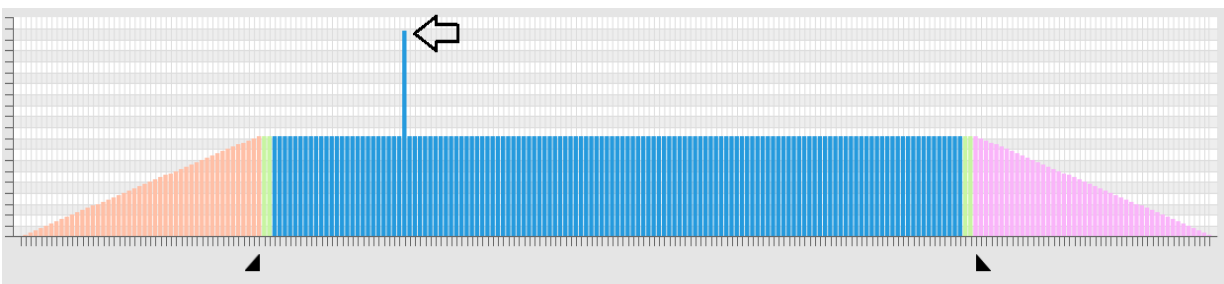
Sliding:

If you choose the option "Slide" after highlighting the desired area, the cursor can be slid across the entire curve, even "around the corner", i.e. after passing position 230 or 1 the curve will slide into the picture from the other side. When sliding, the originally highlighted area will remain active and might have to be deleted.

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Copying:

Like with sliding, the desired area is highlighted and – as we know it from Windows – copied to the buffer memory (**key combination Control C**). Wherever the curve shall be saved use the left mouse button and Shift to mark it and then drop the part of the curve by using the **key combination Control V**. This process can be repeated ad nauseam and can also be applied to other curves.

Removing:

Removing is an identical process, first highlight the desired area and then click on the "Remove" option. In addition to the individual brightness values further parameters of curves have to be defined:

Overview:

Ramp_ON:
Activation and deactivation of the on-ramp with a checkmark. Even if an on-ramp was drawn in the graphics it will not be played back for de-selection. It will be displayed faint.

Ramp_ON starting position:
Notwithstanding the graphics, a starting position may be set within the area highlighted in orange.

Ramp_ON stopping position:
Notwithstanding the graphics, a stopping position may be set within the area highlighted in orange. Identical to starting position.

Speed:
Here the playback speed of an idividual bar can be set. The number value equals the duration in ms/bar.

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Curve_ON:

Activation and deactivation of the curve with a checkmark. Even if a curve was drawn in the graphics it will not be played back for de-selection. Hence, only the on-ramp can be played back, e.g., followed immediately by the off-ramp.

Curve starting and stopping position:

The same is true here as for Ramp_ON. One application of different starting and stopping positions would be having 2 surround lights, where drawing one curve for both would be enough; one curve could be played back 2 positions shorter making the rotating lights become asynchronous soon, which would be closer to real life.

Loop:

The curve area highlighted in green can either have a single run through or be set as a loop. The chekcmark has to be activated if a loop shall be set. Once the "Loop" option has been selected, the start ramp will be played back first, if it is active, while the curve is being activated, then the curve is played back in an endless loop. Only after the curve has been switched off, the curve will follow one of the following options that has been set.

Playback curve to end

Either it will be interrupted immediately and the off-ramp played back if selected or the curve will be played to the preset end and be followed by the off-ramp.

Speed:

The playback speed of individual bars within the green area is adjusted here.

For
Ramp_OFF

Ramp_OFF_ starting and stopping position

Speed

The same is true for Ramp_ON.

Current Max:

Here, the maximum currents from 0-100mA in 1.5 mA increments for curves 1-16 are set. As default, all currents are set to 2mA. Note that even once all other parameters have been set properly, the curve is drawn and then saved to the module, the respective LED/light will remain unlit as long as the maximum current is defined as 0 mA.

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Correction:

The human eye does not perceive fluctuations in light linearly but logarithmically (The Laws of Weber Fechner). i.e. fine variations are well-perceived in darker areas, the fluctuations need to be much larger when it is very bright in order for these to be perceived.

This is accounted for by 3 different correction curves:

Curve 1: linear, no correction

Curve2: square

Curve 3: exponential, this one comes closest to the perception of the eye. This curve is highly recommended for LEDs.

Which curve fits best will depend on the type of lighting that is used, trial and error is the word.

Once all values have been entered click on apply in the bottom left of the window. However, the data has not reached the module yet. To do this either click on "Write Settings" – like for the other modules – or use the newly introduced button "Only Write Changes". This may take up to 15 seconds as a lot of data has to be transferred for the lighting module. If you only make minor changes to a curve, only that new data will be sent, which certainly shortens the process and proves very helpful when making fine adjustments of a curve accompanied by repeated trial runs.


Procedure to assign channel, curve and output:

Firstly, a definition of what the various terms mean:

Channel: a channel is either selected via the remote control or also directly via the outlet pin of the module. 18 channels are available.

Curve: 18 curves are available. Every curve has 230 positions, whereby every position can be set in brightness and playback speed.

Output: The lighting module has 18 outputs. These are the outputs to which the lights will be soldered.

In order to be able to select a LED with a curve, the output first has to be assigned. If more than one LED shall be selected by the same curve these can either be switched in series or parallel, depending on the available current, or the outputs are assigned individually via the software. All 18 outputs can be assigned to one curve if required.
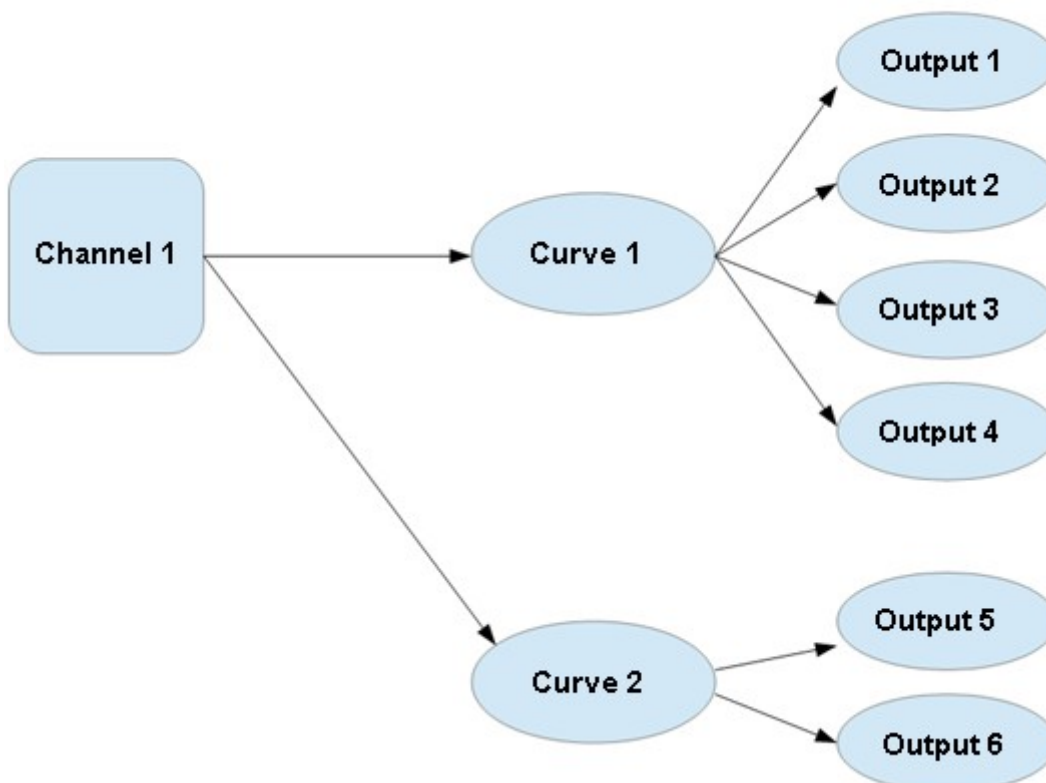
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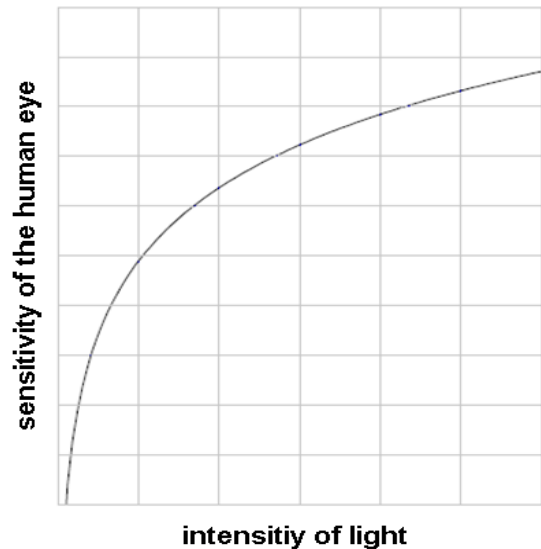
assignment curves to outputs
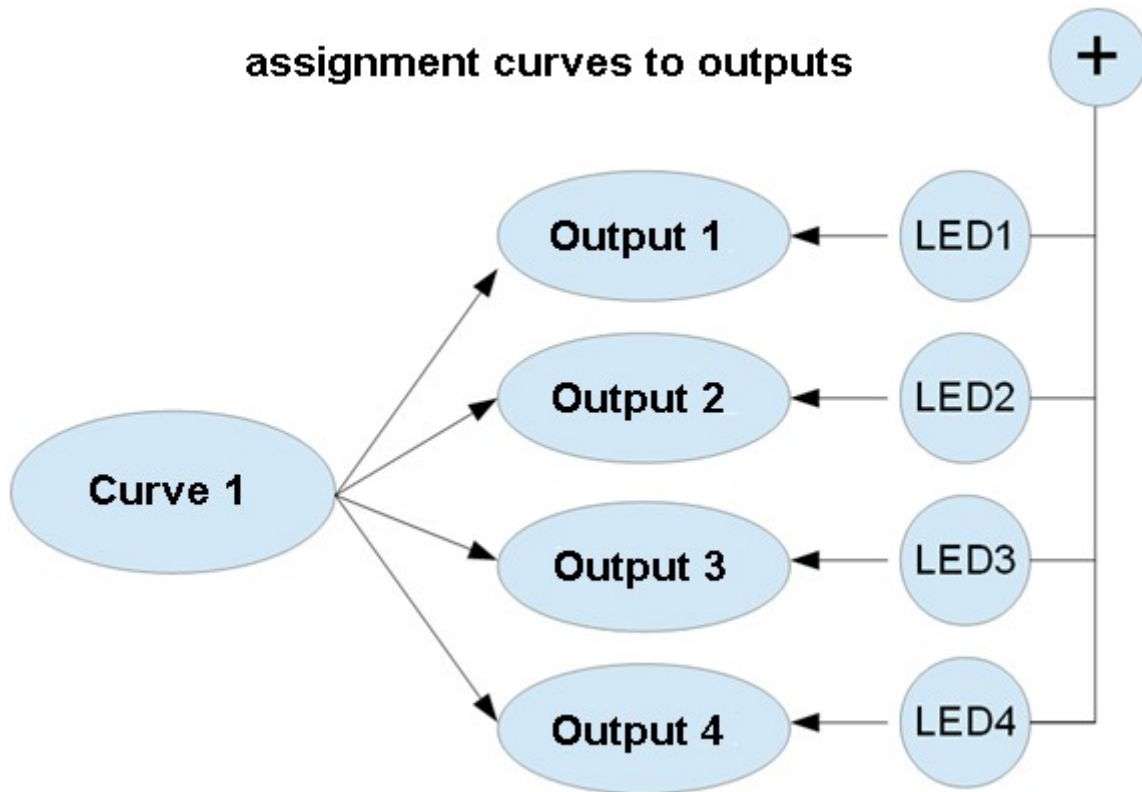
Every channel can have curves assigned to it (selected via the inputs). Theoretically all 18 curves can be assigned to one channel.

assignment channels to curves to outputs

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These assignments can be conducted in the "**Channel Definition**" window. In this example Curve 1 with Output 1 is assigned to Channel 1; i.e.: if Channel 1 is activated via the remote control or locally via the logic controller level, all Curve 1 data will be released at Ouput 1. In order to create a new channel in the table the input fields above the table are required.

▼ channel definition

Channel	Switch off immediately	Curve	Outputs	Add
Channel	**Switch off immed...**	**Curve**	**Outputs**	Remove

Enter the desired values and click on the "Add" button.

▼ channel definition

Channel	Switch off immediately	Curve	Outputs	Add
Channel	**Switch off immed...**	**Curve**	**Outputs**	Remove
1		1	1	

If an additional curve shall be assigned to Channel 1, write on top in the definition line:

▼ channel definition

Channel	Switch off immediately	Curve	Outputs	Add
1		2	2	
Channel	**Switch off immed...**	**Curve**	**Outputs**	Remove
1		1	1	

After clicking "Add" it will look like this:

▼ channel definition

Channel	Switch off immediately	Curve	Outputs	Add
Channel	**Switch off immed...**	**Curve**	**Outputs**	Remove
1		1	1	
		2	2	

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E.g. if further outputs shall be assigned to Curve 2, click directly on the respective field of outputs in the list and amend the input, separated by commas;

complete the editing process by hitting the "Enter" key.

So far the field **"Immediate Shutdown"** has not been treated. Here is the possibility of immediately shutting down operating channels via respective entries before switching on a new channel. As an example, this function can be helpful when realizing the blinker of a vehicle. This makes it possible to directly switch from one side to the other without having to shut one down first.

Inputs:

The lighting module has 5 inputs, which may be assigned different functions. To open the window, click the "**Inputs**" button.

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Selecting input signals:

1) Prop Channel

2) Switch channel decoder Graupner ("Nautic Expert" 4708)

3) Switch channel decoder Robbe ("Multiswitch 16")

4) Edge controlled

5) Level controlled

ad 1 Prop channel:

If this outlet is connected to the receiver, rapid stick movements from middle to a limit switch – in either direction – can activate up to 8 channels on each side.

ad 2 and 3 Switch channel decoder Graupner and Robbe (not yet implemented in V1.00):

If you want to use your old device with a switch channel decoder, this is possible through Graupner and Robbe products. The original position of all switches is always the middle position. 2 options are possible per position of the switch:

a)   On/Off: as long as the switch is in the final position, the channel will be active

b)   Memory: if the switch is returned to the middle position immediately after selection the respective channel remains active.

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ad 4 and 5:

Here, the level of the logic controller and not the impulses of the remote control are analysed. Hence, actuators (e.g. switches) of the model can also impact the lighting module. An additional positive effect is solid usability on a model train set. Digital technology basically only knows 2 states, either "0" or "1"; at "0" the ground potential (equals the minus pole of the source of current) is at the input, for "1" it is the positive voltage. If an input is not connected on the module, level "1" is in contact through the internal wiring. Through a connection to the minus pole (ground) of the module the logic controller level "0" is established. In order to activate a channel there are 2 options:

1. Edge controlled:

This means the switch between 2 states of the logic controller. The negative edge, the switch from "1" to "0", is analysed in the lighting module. If the open output is connected to minus it is called a "negative edge". An assigned channel is activated for this edge. Afterwards it does not matter if the output continues to stay on "0" or returns to "1". The channel is only deactivated once the input identifies a further negative edge. For this, the input will have to have accepted the logic controller level "1" at least for a short period.
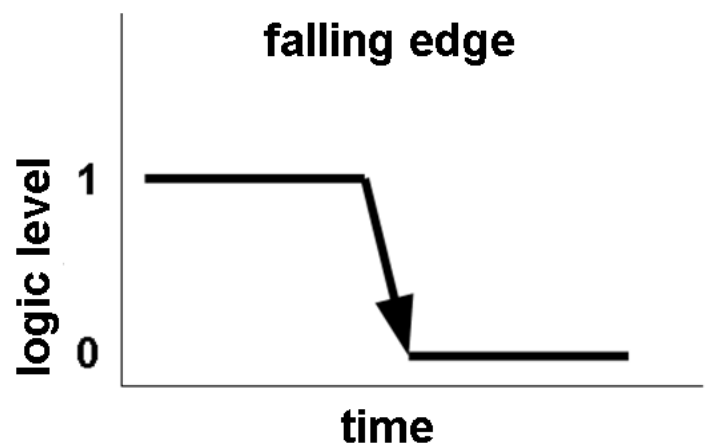
2. Level controlled:

Here, the current state of the logic controller itself is analysed, not the switch between 2 states. As long as the level is "0", the respective channel is active.

Input 1:

This input generally functions as main input for channel selection, either via a prop channel or via a multi-switch (Robbe or Graupner)

Input 2:

If the steering servo is switched parallel to this input, it can also be used for the special function "automatic blinker reset" - aside from edge and level. In the fields "Arrest left" and "Right" the length of the impulses of the steering channel is entered after which the mechanism is kicked off. When steering back to the middle and straightening out the wheels, the blinker shutdown will take place after exceeding/undercutting the preset value.

Tip: The values of the lengths of impulses can be identified in the "General" window once communication to the module has been opened.

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Input 3:

Aside from edge and level, this input can also be used for the special functions "Reverse Light and Brakelight", if the motor regulator is switched parallel to this output. First, enter the length of the impulse of the standstill/middle position of the motor in the field "Middle". In the field "Threshold Reverse Light" the value after which the reverse light shall light up is entered. At the same time the channel selecting the lighting at the output has to be defined.

(not implemented in V1.00 yet) In order to display the brakelight, the dimensionless value dV may be defined by a numeric value between 1 and 10. It indicates at which stick speed the light will be lit when bringing the stick back to the middle. Hence, it also becomes possible to slow down without having the brakelight light up.

Input 4 and 5:

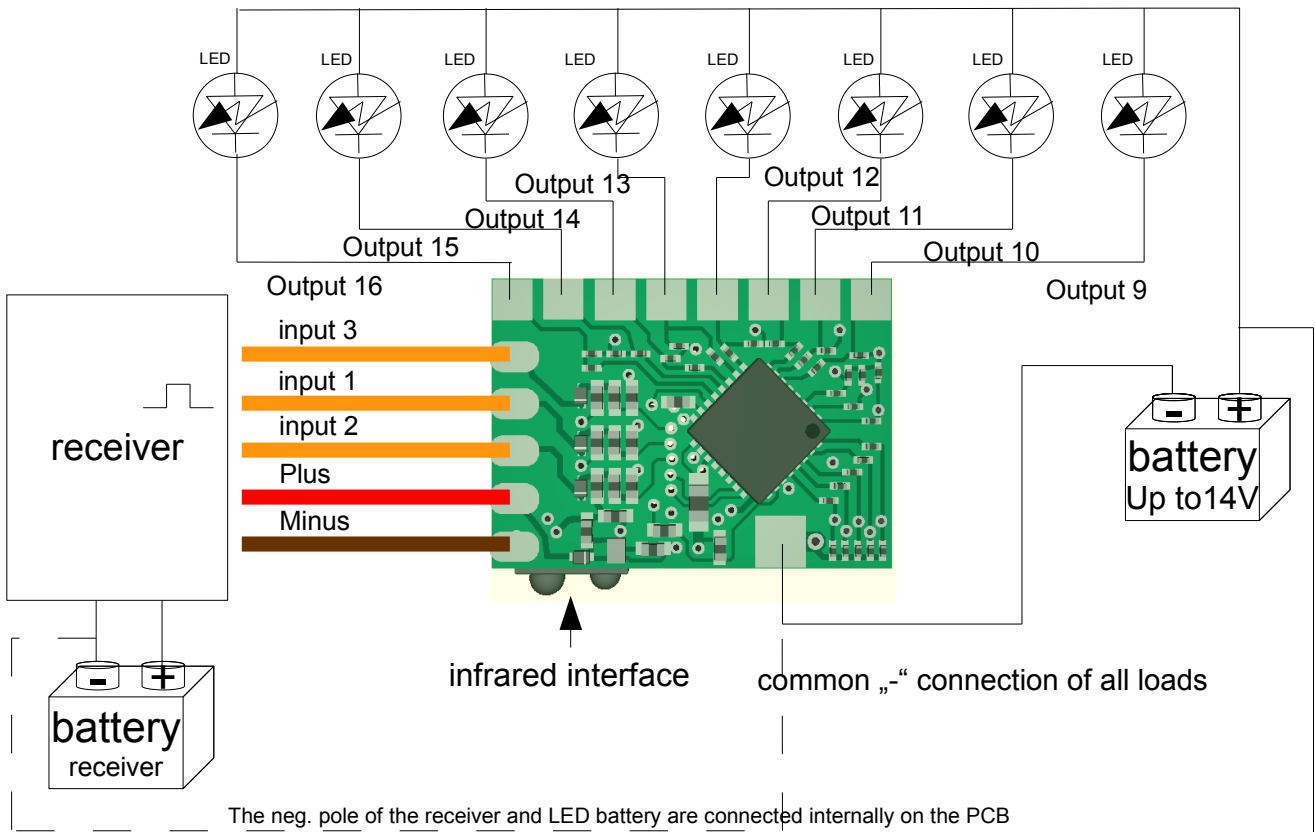Both of these inputs have edge or level functions.

LED Chip:

In order to be able to keep the module as small as possible, a highly integrated LED driver chip is used. Dependent on the supply current of the LEDs and of the preset voltage, power at the chip is more or less "burned", which is then transformed to heat.
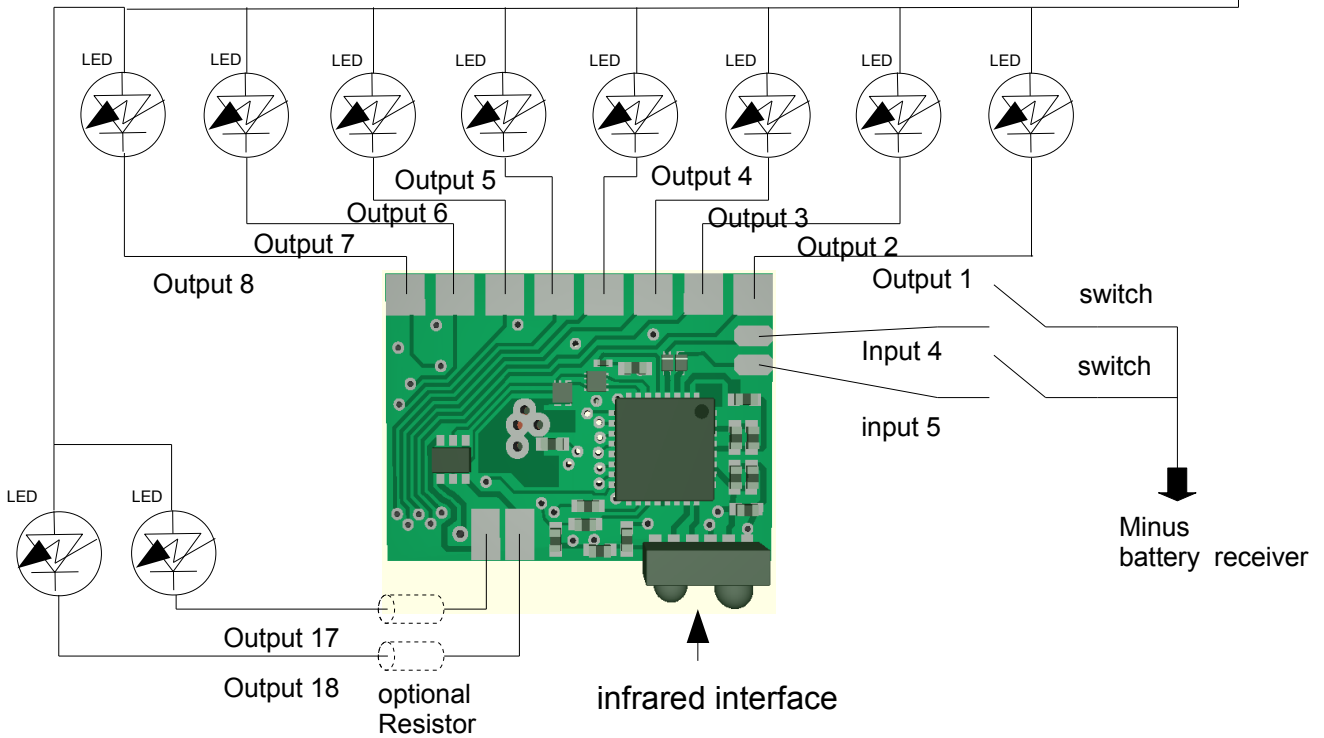
Example:

The positive pole of the LED is suppied by 8V, the LED has a flow voltage of 2V at a current of 10 mA. If the afore-mentioned 10mA are preset via the software, then (for 100% brightness) (10V-2V) x 10 mA is burned at the chip – that equals 80mW. This might not sound like a lot. Howeve, it is important to remember that 16 channels are available and as soon as the output current and the preset voltage increase, the loss of power will increase accordingly. The chip can really heat up sometimes. The temperature is displayed in the "General Window" in the top right when the connection is open. If the temperature increases to more than 125°C the original current is reduced to 50%. If the temperature increases to more than 125°C the original current is reduced to 2mA. Therefore, the module should never be built-in in a hermetically closed off way.

Beware to provide ample ventilation.

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the max current for each LED is set by software from 0 – 100 mA

LED LED LED LED LED LED LED LED

Output 13

Output 12

Output 14

Output 11

Output 15

Output 10

Output 16

input 3

input 1

input 2

Plus

Minus

Output 9

receiver

battery
Up to14V

battery
receiver

infrared interface

common „-" connection of all loads

The neg. pole of the receiver and LED battery are connected internally on the PCB

the max current for each LED is set by software from 0 – 100 mA

LED LED LED LED LED LED LED LED

Output 5

Output 4

Output 6

Output 3

Output 7

Output 2

Output 8

Output 1

switch

Input 4

switch

input 5

LED LED

Minus
battery receiver

Output 17

Output 18

optional
Resistor

infrared interface

Caution:
Output 17 and 18 provide up to 500mA per pin, however without any
current limit, essential to use a resistor for LEDs

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Technical Data:

Power supply of the module: 3.4 – 14.5V(charged lead battery)
Power supply of the diodes : 1.5 – 14.5V(charged lead battery)

16 channels : 0 – 100 mA each, adjustable via the software
2 channels   : up to 500 mA each, this is a transistor power amplifier
                without a limitation to the current !!!!

5 inputs

Items shipped:

1 x module MicroLight
3 x servo wire
1 x CD

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