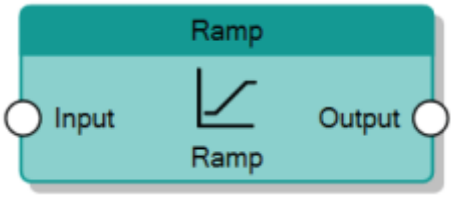
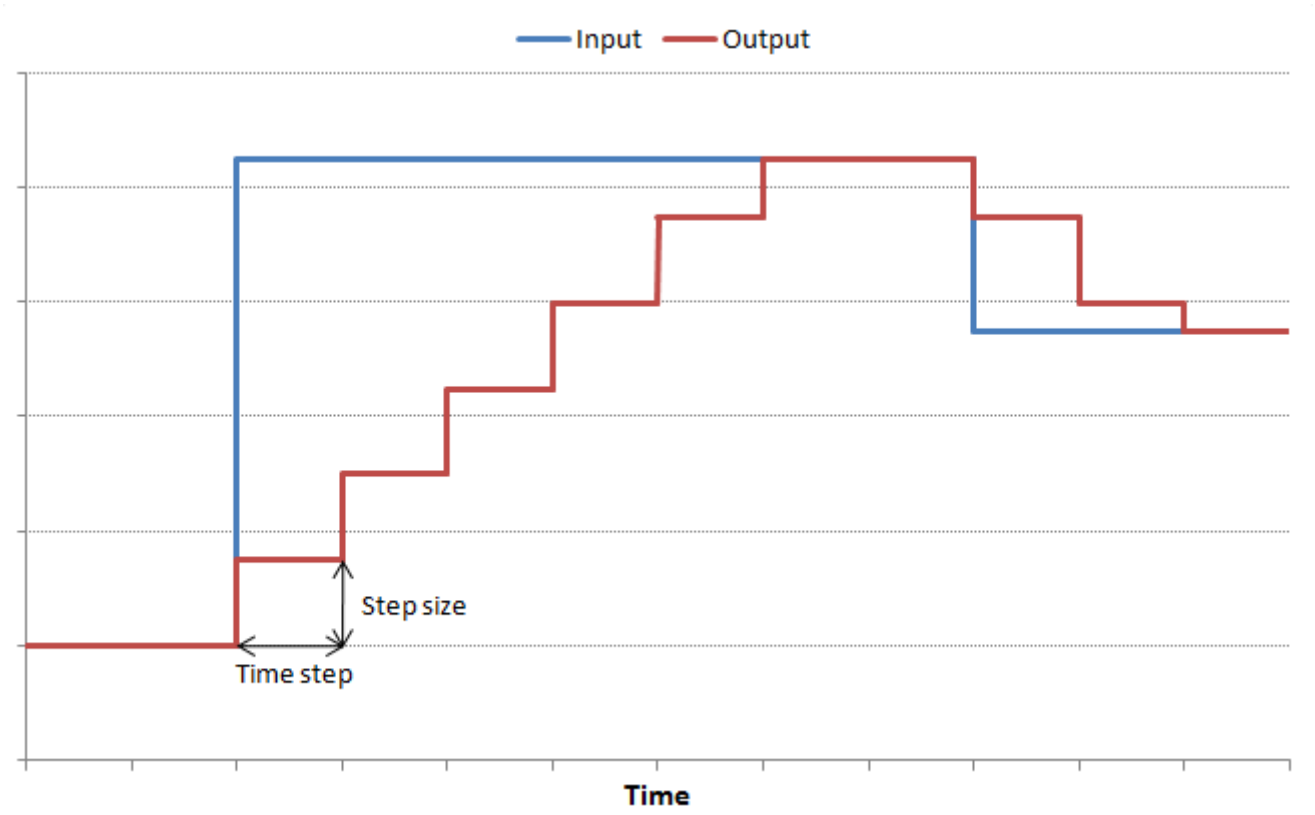
Ramp



The **Ramp** node increases or decreases in a linear way the value of the **Output** connector until it reaches the value of the **Input** connector. The linear increment consists of adding (or subtracting) to the **Output** a value represented by the **Step size** property every time interval specified by the **Time step** property.
The value of the **Output** can't go beyond the **Input** value, so the node reduces the step to adapt the output to the input.



Behaviour of Ramp

Connectors

Connector	Type	Description
Input	Input	Target analog value that the node must reach progressively.
Output	Output	Analog value generated by the node. It is increased or decreased step by step until it reaches the **Input** value.

Main properties

Property	Description
Step size	Value added to or subtracted from the **Output** at each step.
Time step	Time interval between two consecutive increments or decrements of the **Output** value.

Operation

The Ramp node is used to change an analog value progressively instead of applying the final target value immediately.

When the value of the **Input** connector changes, the node compares it with the current **Output** value:

- if **Input** is greater than **Output**, the node increases the **Output** value;
- if **Input** is lower than **Output**, the node decreases the **Output** value;
- if **Input** and **Output** are equal, the output remains unchanged.

At every time interval defined by **Time step**, the node changes the **Output** value by the amount defined in **Step size**.

Conceptually:

Output(n+1) = Output(n) ± Step size

The node continues this operation until the **Output** value reaches the **Input** value.



The **Output** value never exceeds the **Input** value.
If the remaining difference is smaller than the configured **Step size**, the node automatically reduces the last step so that the output reaches the target exactly.

Example

Consider the following configuration:

Property	Value
Step size	5
Time step	1 s

If the initial **Output** value is **20** and the **Input** value becomes **35**, the Ramp node behaves as follows:

Time	Output
0 s	20
1 s	25
2 s	30

Time	Output
3 s	35

If the **Input** value then changes to **12**, the node decreases the output:

Time	Output
0 s	35
1 s	30
2 s	25
3 s	20
4 s	15
5 s	12

In the last step, the node does not go below the target value. Instead, it adapts the final decrement to reach the **Input** value exactly.

Typical applications

The Ramp node is useful whenever a value must change smoothly over time instead of changing abruptly.

Typical applications include:

- progressive variation of a setpoint;
- smooth dimming or brightening transitions;
- gradual opening or closing values;
- avoiding sudden variations on controlled devices;
- creating analog transitions in logic sequences.

Verification through simulation

The Ramp node can be tested using the Logic Module simulation tools.

A typical test procedure is the following:

- connect a variable analog value to the **Input** connector;
- configure **Step size** and **Time step**;
- start the simulation;
- change the input value;
- observe how the **Output** value approaches the **Input** progressively;
- verify that the **Output** changes by the configured step at each configured time interval;
- verify that the last increment or decrement is automatically adapted when needed.



If the **Input** value changes again while the ramp is already in progress, the node continues adapting the **Output** toward the new target value.

Configuration notes

- A larger **Step size** makes the ramp faster.
- A smaller **Step size** makes the ramp smoother.
- A shorter **Time step** increases the update frequency of the output.
- A longer **Time step** slows down the transition.
- Choose **Step size** and **Time step** according to the required smoothness and response speed.
- The Ramp node is useful when abrupt value changes should be avoided.
- Always verify the final behaviour on the real installation if the ramp controls external devices or setpoints.

Related pages

- Logic Module
- Logic Module - Simulation management
- PID Controller
- Range

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