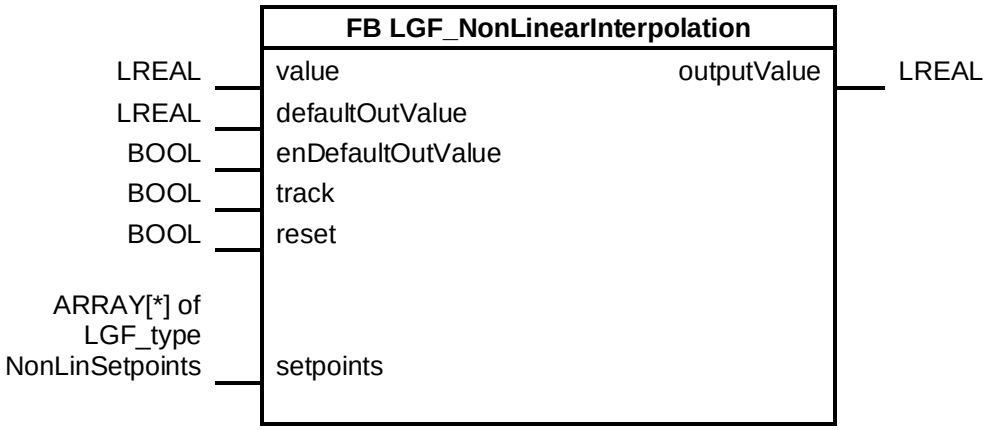
LGF_NonLinearInterpolation

Short description

This block implements a characteristic curve. The characteristic curve is defined via an interpolation point table with linear interpolation between the interpolation points. A prescribed input value generates an output value in each cycle based on the characteristic curve from the interpolation point table.

Block



Input parameters

Parameters	Data type	Description
value	REAL	Input value for calculating the output value over the defined characteristic curve.
defaultOutValue	REAL	Standard output value without using the characteristic curve
enDefaultOutValue	BOOL	Activation of the standard output value The standard output value is output as long as this input is set. (outputValue = defaultOutValue)
track	BOOL	The value of the output “outputValue” follows the value of the input “value” without using the characteristic curve as long as this input is set. (outputValue = value)
reset	BOOL	If the interpolation point table is changed in running operation, the input “reset” must be activated afterwards. Otherwise, the block cannot guarantee correct execution. (outputValue = 0.0)

Input/output parameters (InOut)

Parameters	Data type	Description
setpoints	ARRAY[*] of LGF_typeNonLinSetpoints	Support point table for defining the characteristic curve (polynomial).

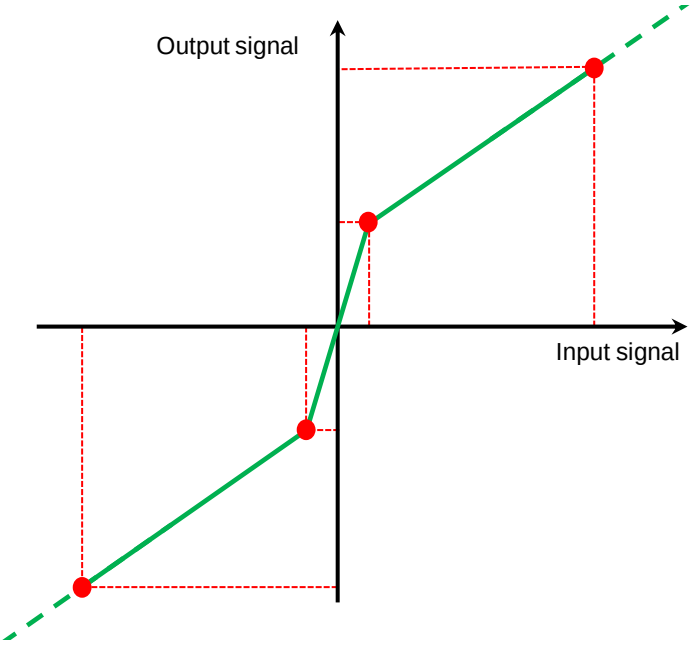
Output parameters

Parameters	Data type	Description
outputValue	REAL	The output value that has been calculated from the input value over the defined characteristic curve.

Principle of operation

The value of the output “outputValue” based on the following priority:

1. As long as the input “enDefaultOutValue” is set, the value defined via the parameter “defaultOutValue” will be output as output value.
1. As long as the input “reset” is set, the block is reset and the output value is 0.0.
2. As long as the “track” input is set, the output value will be output directly as input value, without consideration of the characteristic curve.
3. Based on the input value, a characteristic curve value is calculated via the linearly interpolated, interpolation point table and output as an output value.
   - If the input value is between two interpolation points within the interpolation point table, the output value is calculated as the intersection with the connecting line between the preceding and following interpolation points.
   - If the input value is before the first interpolation point (lowest value defined in the interpolation point table), the output value will be calculated as the intersection of the line formed by the first two interpolation points of the interpolation point table.
   - If the input value is after the last interpolation point (highest value defined in the interpolation point table), the output value will be calculated as the intersection of the line formed by the last two interpolation points of the interpolation point table.



NOTICE	To keep the computing time of the block as short as possible, there is no check of the parameterization or the data of the interpolation point table. When entering the interpolation points in the interpolation point table, the following particularities must be taken into account. If these particularities are not taken into account the block can malfunction. • At least two interpolation points must be entered in the interpolation point table. • The interpolation points in the interpolation point table must be entered in the Table in ascending order of the input values.

Interpolation point table

The interpolation point table is implemented through a variable of the data type Array. The type of the array corresponds to the PLC data type “LGF_typeNonLinSetpoints”.

You can create the interpolation point table in any global data block. The size of the array depends on the number of interpolation points.

Example

	Name	Data type	Start value
1	Static		
2	nonLinSetpoints	Array[0..4] of "LGF_typeNonLinSetpoints"	
3	nonLinSetpoints[0]	"LGF_typeNonLinSetpoints"	
4	inputValue	LReal	-2000.0
5	outputValue	LReal	-2200.0
6	nonLinSetpoints[1]	"LGF_typeNonLinSetpoints"	
7	inputValue	LReal	-200.0
8	outputValue	LReal	-400.0
9	nonLinSetpoints[2]	"LGF_typeNonLinSetpoints"	
10	inputValue	LReal	0.0
11	outputValue	LReal	0.0
12	nonLinSetpoints[3]	"LGF_typeNonLinSetpoints"	
13	inputValue	LReal	200.0
14	outputValue	LReal	400.0
15	nonLinSetpoints[4]	"LGF_typeNonLinSetpoints"	
16	inputValue	LReal	2000.0
17	outputValue	LReal	2200.0

Further information on libraries in TIA Portal:

- Topic page libraries
  https://support.industry.siemens.com/cs/ww/en/view/109738702
- Guideline on Library Handling
  https://support.industry.siemens.com/cs/ww/en/view/109747503
- Programming Guideline for S7-1200/1500 in chapter “Libraries”
  https://support.industry.siemens.com/cs/ww/en/view/81318674
- Programming Styleguide
  https://support.industry.siemens.com/cs/ww/en/view/81318674