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ELAUSYS

Logic Module
User Manual

Document history			
Version.	**Date**	**Author**	**Comment**
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1. INTRODUCTION

The logic module is a virtual extension module that can be used on the Universal actuator system or the solar inverters gateways. Each logic module includes 8 logic functions. Up to 8 extensions modules can be used on a device, it is therefore possible to configure up to 64 logic functions.

For each channel, the following logic function can be configured:

- Logic Gate
- Sequence
- Trigger
- Math

2. CONFIGURATION

2.1 EXTENSIONS USED

The extensions section defines which extension modules are used in the system. Up to 8 extensions may be configured.

Configuring an extension is limited to choosing its type from the dropdown list, for the logic module, select :

EXTENSION TYPE
Logic Module 8-fold

Once an extension is selected, a new tab is created to configure the channels of this extension.

2.2 CHANNEL USE

In case of a logic module, for each of the 8 channels, it is possible to select the following function.

CHANNEL USE
Not used
Logic gates
Sequence
Trigger
Math

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3. FUNCTIONS

3.1 LOGIC GATES

The logic gate function is a 8-binary inputs logic gate with the following features:

- Logic gate selection: AND, OR, XOR
- Each of the 8 inputs can be enable individually
- Each of the 8 inputs can be inverted individually (NOT function on the input)
- Output can be inverted (NOT function on the output)
- Selection of which values should be sent on the bus (only true, only false or both values)
- Selection to send values at any input change or only when output changes
- Option to delay the output

The channel can be blocked from the KNX bus using the “Block” communication object. When a channel is blocked, Input changes have no effect on the output.

3.1.1 PARAMETERS

PARAMETER	VALUES	DESCRIPTION
Channel description	▪ Text	Channel description that is displayed in the channel menu and in the group objects name of this channel
Logic gate	▪ AND ▪ OR ▪ XOR	Logic gate function to be used between all inputs
Send condition	▪ At any input change ▪ At output change	Selection if the output value is to be send on the bus at each change of the input or only if the output changes
Send values	▪ **TRUE/FALSE (default)** ▪ Only TRUE ▪ Only FALSE	By default all output values are sent to the bus but it can be limited to only TRUE or only FALSE values.
Input x (x= 1 to 8)	▪ **Not used (default)** ▪ **Not inverted** ▪ **Inverted**	Selection of the input to be used. When selecting an input it can be inverted or not.
Output type	▪ **Not inverted (default)** ▪ Inverter	Selection if the output should be inverted or not.
Output delay	▪ **0 (default)** 0..255	Delay to send the output based on the “delay unit” parameter.
Delay unit	▪ 100ms ▪ **seconds (default)** ▪ minutes	Delay units for the output delay value.

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3.1.2 COMMUNICATION OBJECTS

NR	NAME	FUNCTION	SIZE	FLAGS	TYPE
1	Block	On/Off	1 bit	CRW	1.003 - enable
2	Input 1	True/False	1 bit	CW	1.002 - Boolean
3	Input 2	True/False	1 bit	CW	1.002 - Boolean
4	Input 3	True/False	1 bit	CW	1.002 - Boolean
5	Input 4	True/False	1 bit	CW	1.002 - Boolean
6	Input 5	True/False	1 bit	CW	1.002 - Boolean
7	Input 6	True/False	1 bit	CW	1.002 - Boolean
8	Input 7	True/False	1 bit	CW	1.002 - Boolean
9	Input 8	True/False	1 bit	CW	1.002 - Boolean
10	Output	True/False	1 bit	CRT	1.002 - Boolean

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3.2 SEQUENCE

The sequence function is a 4 steps sequence that is triggered from a binary input object with the following features:

- 4 steps sequence
- Adjustable delay between each step
- Single sequence execution on trigger or cyclic while the trigger is active
- Output type and value configurable for each step from the following objects
  - Switch - DPT 1.001
  - Scene - DPT 18.001
  - Percent value - DPT 5.001
  - RGB Color value - DPT 232.600
  - Tunable white value (Brightness & Temperature)
  - 1-byte unsigned value (0-255) - DPT 5.005
  - 2-bytes unsigned - DPT 7.*
  - 2-bytes signed - DPT 8.*
  - 2-bytes float - DPT 9.*

The channel can be blocked from the KNX bus using the “Block” communication object. When a channel is blocked, Input trigger is not taken into account.

3.2.1 PARAMETERS

PARAMETER	VALUES	DESCRIPTION
Channel description	▪ Text	Text displayed in the channel menu and in the group objects name of this channel
Sequence execution	▪ When received ON trigger ▪ When received OFF trigger ▪ When received ON or OFF trigger ▪ Cyclic while ON ▪ Cyclic while OFF	Selection on the sequence trigger value or if the sequence is executed cyclically
Duration unit	▪ 100ms ▪ **seconds (default)** ▪ minutes	Duration units for the transition delay between each step.
Sequence Step x (1 to 4)		
Output type	▪ **Not used (default)** ▪ Switch - DPT 1.001 ▪ Scene - DPT 18.001 ▪ Percent value - DPT 5.001 ▪ RGB Color value - DPT 232.600 ▪ Tunable white value (Brightness & Temperature) ▪ 1-byte unsigned value (0-255) - DPT 5.005 ▪ 2-bytes unsigned - DPT 7.* ▪ 2-bytes signed - DPT 8.* ▪ 2-bytes float - DPT 9.*	Datatype of the value to be sent on the bus when the step is activated
Send value	▪ **0 (default)** Value range based on the selected	Value to be sent on the bus when the step is activated

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	output type range	
Step duration	▪ **0 (default)** 0..255	Delay for the transition to the next step based on the “duration unit” parameter.

3.2.2 COMMUNICATION OBJECTS

NR	NAME	FUNCTION	SIZE	FLAGS	TYPE
1	Block	On/Off	1 bit	CRW	1.003 - enable
2	Trigger	On/Off	1 bit	CRW	1.017 - trigger
3 *	Step 1 Output - Value	True/False	1 bit	CRT	1.001 - switch
4 *	Step 2 Output - Value	True/False	1 bit	CRT	1.001 - switch
5 *	Step 3 Output - Value	True/False	1 bit	CRT	1.001 - switch
6 *	Step 4 Output - Value	True/False	1 bit	CRT	1.001 - switch
7	Step 1 Output - Brightness	Percent	1 byte	CRT	5.001 - percentage
8	Step 2 Output - Brightness	Percent	1 byte	CRT	5.001 - percentage
9	Step 3 Output - Brightness	Percent	1 byte	CRT	5.001 - percentage
10	Step 4 Output - Brightness	Percent	1 byte	CRT	5.01 - percentage

* Depending on the chosen datatype for the output of each step, these group objects can have the following configurations:

NAME	FUNCTION	SIZE	FLAGS	TYPE
Step x Output - Value	True/False	1 bit	CRT	1.001 – switch
Step x Output - Scene	Scene	1 byte	CRT	18.001 – Scene control
Step x Output - Percent	Percent	1 byte	CRT	5.001 – percentage
Step x Output - RGB	RGB	3 bytes	CRT	232.600 – RGB value
Step x Output - Temperature	Percent	1 byte	CRT	5.001 – percentage
Step x Output - Value	1 byte	1 byte	CRT	5.005 – 1-byte unsigned
Step x Output - Value	2 bytes	2 bytes	CRT	7.x – 2-bytes unsigned
Step x Output - Value	2 bytes	2 bytes	CRT	8.x – 2 bytes signed
Step x Output - Value	2 bytes	2 bytes	CRT	9.x – 2 bytes float

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3.3 TRIGGER

The trigger function allows to trigger an output based on 2 inputs values and defined conditions with the following features:

- Integrated weekly calendar to trigger actions based on weekday and time
- Evaluation of each input values based on fixed values or compared to second group object
- Each input value is evaluated with the compared value according to the selection
  - Equal (=)
  - Greater than (>)
  - Less than (<)
  - Unequal (!=)
  - Greater or equal (>=)
  - Less or equal (<=)
  - Always true
- Selectable logic between the 2 inputs: AND, OR, XOR, NAND, NOR, XNOR
- Inputs type individually configurable from the following objects type
  - Switch - DPT 1.001
  - Scene - DPT 18.001
  - Percent value - DPT 5.001
  - 1-byte unsigned value (0-255) - DPT 5.005
  - 2-bytes unsigned - DPT 7.*
  - 2-bytes signed - DPT 8.*
  - 2-bytes float - DPT 9.*
  - 4-bytes unsigned - DPT 12.*
  - 4-bytes signed - DPT 13.*
  - 4-bytes float - DPT 14.*
  - Weekly calendar (week day, hour, minute)
- Selection to send output value at any input change or only when output changes
- Option to delay the output
- Selection of output value from a fixed value or from input 1
- Function output configurable from the following objects type
  - Switch - DPT 1.001
  - Scene - DPT 18.001
  - Percent value - DPT 5.001
  - RGB Color value - DPT 232.600
  - Tunable white value (Brightness & Temperature)
  - 1-byte unsigned value (0-255) - DPT 5.005
  - 2-bytes unsigned - DPT 7.*
  - 2-bytes signed - DPT 8.*
  - 2-bytes float - DPT 9.*
  - 4-bytes unsigned - DPT 12.*
  - 4-bytes signed - DPT 13.*
  - 4-bytes float - DPT 14.*

The channel can be blocked from the KNX bus using the “Block” communication object. When a channel is blocked, Input changes have no effect on the output.

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3.3.1 PARAMETERS

PARAMETER	VALUES	DESCRIPTION
Channel description	▪ Text	Channel description that is displayed in the channel menu and in the group objects name of this channel
Inputs evaluation	▪ **Input 1 and 2 with fixed values** ▪ Input 1 fixed and 2 with comparative object ▪ Input 1 with comparative object ▪ and 2 fixed ▪ Input 1 and 2 with comparative object	Selection of the inputs comparative values
Logic between input 1 and 2	▪ **AND (default)** ▪ OR ▪ XOR ▪ NAND ▪ NOR ▪ XNOR	Selection of the logic operation between input 1 and 2
Input x (1 to 2)		
Input type	▪ **Not used (default)** ▪ Switch - DPT 1.001 ▪ Scene - DPT 18.001 ▪ Percent value - DPT 5.001 ▪ 1-byte unsigned value (0-255) - DPT 5.005 ▪ 2-bytes unsigned - DPT 7.* ▪ 2-bytes signed - DPT 8.* ▪ 2-bytes float - DPT 9.* ▪ 4-bytes unsigned - DPT 12.* ▪ 4-bytes signed - DPT 13.* ▪ 4-bytes float - DPT 14.* ▪ Weekly calendar	Datatype of the input value
Input condition	▪ Equal (=) ▪ Greater than (>) ▪ Less than (<) ▪ Unequal (!=) ▪ Greater or equal (>=) ▪ Less or equal (<=) ▪ Always true	Condition to compare the input value with the compared value (from group object or fixed value)
Value	▪ **0 (default)** ▪ Value range based on the selected output type range	Value to be compared with input value when a fixed value is selected for this input
Output		
Output value source	▪ **Output fixed value (default)** ▪ Value from input 1	Selection if the output value is fixed or a copy of input 1 value.
Send output value	▪ **At any input received (default)** ▪ At input 1 received only	Selection if the output value is to be send on the bus at each change of the inputs or

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	▪ At input 2 received only ▪ Once at valid output conditions ▪ Once at valid input 1 conditions only ▪ Once at valid input 2 conditions only	only once when the conditions become valid
Output type	▪ **Not used (default)** ▪ Switch - DPT 1.001 ▪ Scene - DPT 18.001 ▪ Percent value - DPT 5.001 ▪ RGB Color value - DPT 232.600 ▪ Tunable white value (Brightness & Temperature) ▪ 1-byte unsigned value (0-255) - DPT 5.005 ▪ 2-bytes unsigned - DPT 7.* ▪ 2-bytes signed - DPT 8.* ▪ 2-bytes float - DPT 9.* ▪ 4-bytes unsigned - DPT 12.* ▪ 4-bytes signed - DPT 13.* ▪ 4-bytes float - DPT 14.*	Datatype of the value to be sent on the bus when the trigger is activated
Send value	▪ **0 (default)** ▪ Value range based on the selected output type range	Fixed value to be sent on the bus when trigger is activated
Output delay	▪ **0 (default)** ▪ 0..255	Delay to send the output based on the “delay unit” parameter.
Delay unit	▪ 100ms ▪ **seconds (default)** ▪ minutes	Delay units for the output delay value.

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3.3.2 COMMUNICATION OBJECTS

NR	NAME	FUNCTION	SIZE	FLAGS	TYPE
1	Block	On/Off	1 bit	CRW	1.003 - enable
3 *	Input 1 - Switch	True/False	1 bit	CW	1.001 - switch
4 *	Input 1 – Compared value	True/False	1 bit	CW	1.001 - switch
5 *	Input 2 - Switch	True/False	1 bit	CW	1.001 - switch
6 *	Input 2 – Compared value	True/False	1 bit	CW	1.001 - switch
7 **	Output - Switch	Percent	1 bit	CRT	5.001 - percentage
8	Output - Brightness	Percent	1 byte	CRT	5.001 - percentage

* Depending on the chosen datatype for the inputs, these group objects can have the following configurations:

NAME	FUNCTION	SIZE	FLAGS	TYPE
Input x - Switch	True/False	1 bit	CW	1.001 – switch
Input x - Scene	Scene	1 byte	CW	18.001 – Scene control
Input x - Percent	Percent	1 byte	CW	5.001 – percentage
Input x - Value	1 byte	1 byte	CW	5.005 – 1-byte unsigned
Input x - Value	2 bytes	2 bytes	CW	7.x – 2-bytes unsigned
Input x - Value	2 bytes	2 bytes	CW	8.x – 2 bytes signed
Input x - Value	2 bytes	2 bytes	CW	9.x – 2 bytes float
Input x - Value	4 bytes	4 bytes	CW	12.x – 4-bytes unsigned
Input x - Value	4 bytes	4 bytes	CW	13.x – 4 bytes signed
Input x - Value	4 bytes	4 bytes	CW	14.x – 4 bytes float

** Depending on the chosen datatype for the output, this group object can have the following configurations:

NAME	FUNCTION	SIZE	FLAGS	TYPE
Output - Value	True/False	1 bit	CRT	1.001 – switch
Output - Scene	Scene	1 byte	CRT	18.001 – Scene control
Output - Percent	Percent	1 byte	CRT	5.001 – percentage
Output - RGB	RGB	3 bytes	CRT	232.600 – RGB value
Output - Temperature	Percent	1 byte	CRT	5.001 – percentage
Output - Value	1 byte	1 byte	CRT	5.005 – 1-byte unsigned
Output - Value	2 bytes	2 bytes	CRT	7.x – 2-bytes unsigned
Output - Value	2 bytes	2 bytes	CRT	8.x – 2 bytes signed
Output - Value	2 bytes	2 bytes	CRT	9.x – 2 bytes float
Output - Value	4 bytes	4 bytes	CRT	12.x – 4-bytes unsigned

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Output - Value	4 bytes	4 bytes	CRT	13.x – 4 bytes signed
Output - Value	4 bytes	4 bytes	CRT	14.x – 4 bytes float

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3.4 MATH

The math function allows to perform mathematical operation on 2 inputs values with the following features:

- Selectable mathematical operation
  - Addition (+)
  - Substraction (-)
  - Multiplication (*)
  - Division (/)
  - Minimum of two inputs
  - Maximum of two inputs
  - Average of two inputs
- Selectable Input 2 value from a fixed value or from a group object
- Inputs type configurable from the following objects type
  - Percent value - DPT 5.001
  - 1-byte unsigned value (0-255) - DPT 5.005
  - 2-bytes unsigned - DPT 7.*
  - 2-bytes signed - DPT 8.*
  - 2-bytes float - DPT 9.*
  - 4-bytes unsigned - DPT 12.*
  - 4-bytes signed - DPT 13.*
  - 4-bytes float - DPT 14.*
- Selection to send output value at any input change or only when output changes
- Option to delay the output

The channel can be blocked from the KNX bus using the “Block” communication object. When a channel is blocked, Input changes have no effect on the output.

3.4.1 PARAMETERS

PARAMETER	VALUES	DESCRIPTION
Channel description	▪ Text	Channel description that is displayed in the channel menu and in the group objects name of this channel
Operation	▪ Addition (+) ▪ Substraction (-) ▪ Multiplication (*) ▪ Division (/) ▪ Minimum of two inputs ▪ Maximum of two inputs ▪ Average of two inputs	Selection of the mathematical operation to perform between the two inputs values
Objects type	▪ Percent value - DPT 5.001 ▪ **1-byte unsigned value (0-255) - DPT 5.005 (default)** ▪ 2-bytes unsigned - DPT 7.* ▪ 2-bytes signed - DPT 8.* ▪ 2-bytes float - DPT 9.* ▪ 4-bytes unsigned - DPT 12.*	Datatype of the inputs value

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	▪ 4-bytes signed - DPT 13.* ▪ 4-bytes float - DPT 14.*	
Send condition	▪ **At any input change (default)** ▪ At output change	Selection if the output value is to be send on the bus at each change of the inputs or only when the output changes
Type of input 2	▪ **Objects (default)** ▪ Fixed value	Selection if input 2 value is received from a group object or set as a fixed value
Value	▪ **0 (default)** ▪ Value range based on the selected objects type range	Value of input 2 if a fixed value is selected for this input
Output		
Output delay	▪ **0 (default)** ▪ 0..255	Delay to send the output based on the "delay unit" parameter.
Delay unit	▪ 100ms ▪ **seconds (default)** ▪ minutes	Delay units for the output delay value.

3.4.2 COMMUNICATION OBJECTS

NR	NAME	FUNCTION	SIZE	FLAGS	TYPE
1	Block	On/Off	1 bit	CRW	1.003 - enable
3 *	Input 1 – Value	Percent	1 bit	CW	5.001 - percentage
5 *	Input 2 – Value	Percent	1 bit	CW	5.001 - percentage
7 *	Output – Value	Percent	1 bit	CRT	5.001 - percentage

* Depending on the chosen datatype for the objects, these group objects can have the following configurations:

NAME	FUNCTION	SIZE	FLAGS	TYPE
Input x /Output - Percent	Percent	1 byte	CW	5.001 – percentage
Input x /Output - Value	1 byte	1 byte	CW	5.005 – 1-byte unsigned
Input x /Output - Value	2 bytes	2 bytes	CW	7.x – 2-bytes unsigned
Input x /Output - Value	2 bytes	2 bytes	CW	8.x – 2 bytes signed
Input x /Output - Value	2 bytes	2 bytes	CW	9.x – 2 bytes float
Input x /Output - Value	4 bytes	4 bytes	CW	12.x – 4-bytes unsigned
Input x /Output - Value	4 bytes	4 bytes	CW	13.x – 4 bytes signed
Input x /Output - Value	4 bytes	4 bytes	CW	14.x – 4 bytes float