

# Analog Outputs

## USER MANUAL

Translation of the original instructions

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Any information inside this manual can be changed without advice.

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Exclusion of liability:

Despite checking that the contents of this document match the hardware and software, deviations cannot be completely excluded. We therefore cannot accept any liability for this.

Any necessary corrections will be incorporated into newer versions of this manual.

Symbol for relevant information



Symbol for warning



# 1. Analog Outputs

## Analog Outputs – Description

Analog outputs 0-10 V are used to communicate to specific devices using a direct coupling signal allowing precise commands to be delivered. In case of coupled outputs their value is interlocked, only one can be active at the same time.

## Analog Output

This section describes parameters and objects available when setting output 0-10V as independent.

For each analog output, the mode chosen from the drop-down menu Output function can be set in the specific ETS page (will be explained shortly); the default is <Analog Out x> Simple. Each setting activates a specific object, according to the following table.

<Analog Out x> Command %	1 byte	CW
<Analog Out x> Discretized Command %	1 byte	CW
<Analog Out x> Interlock Command %	1 byte	CW
These three objects are associated with the output set as “simple”. The first object defines the contained value, i.e. the voltage in relation to the percentage. The second object approximates the value to the closer value defined by parameters. The third object is used to set the minimum value when a value different from zero is received.		
<Analog Out x> Cool %	1 byte	CW
<Analog Out x> Heat %	1 byte	CW
These two objects are associated with the output set as “6-way valve” and define the voltage value corresponding to the percentage contained in the telegram, which determine the opening in cooling or heating.		
<Analog Out x> Increase/Decrease	1 bit	CW
<Analog Out x> Command %	1 byte	CW
<Analog Out x> Index	1 byte	CW
These three objects are associated with the “step/index” mode: the first indicates whether the output voltage must increase or decrease at each step; the second indicates at what percentage to set the output; the third (enabled by parameter) indicates a 1 byte value associated to the output value.		
<Analog Out x> Speed 1	1 bit	CW
<Analog Out x> Speed 2	1 bit	CW
<Analog Out x> Speed 3	1 bit	CW
These three 1-bit objects are associated with the “fan-coil 3 speed” mode and each set an output voltage corresponding to the speed (they are ON only one at a time).		
<Analog Out x> Interpolation Value	2 bytes	CW
<Analog Out x> Interpolation Value for 0%	2 bytes	CW
<Analog Out x> Interpolation Value for 100%	2 bytes	CW
These objects define the state of the output resulting from the interpolation of value between the two limits set (value for 0% and for 100%); the type of objects is selected through parameters.		

On the ETS page relating to analog outputs, the first box is used to assign a name to the input itself, which can facilitate mnemonically identification in the building. The other parameters and their settings are described below.

KNX PARAMETER	SETTINGS
Output name	Free field (alphanumerical)
This parameter defines the output name to be used to rapidly identify it.	

Output voltage	0-10 V 1-10 V 2-10 V
It sets the range of variation of the output voltage, or establishes the minimum voltage that the output can assume. Based on the chosen setting, the “Voltage x-10 V” item at the bottom of the ETS page and the table next to it change, which for practical purposes suggests how the generated voltage depends on rounded binary values (Value 0-255) or percentages (Value 0-100%) coming from the bus.	
Lock function	disabled / enabled
This parameter is used to enable lock function to set output value and prevent any change for the time being.	
Feedback	disabled / enabled
If enabled, it is used to send the state assumed by the corresponding analog output to the bus.	
Output is valve	no / yes
By choosing “yes” under this parameter, the following items appear. If the “subordinate” option is set, the output responds to the global object All valves closed; on the ETS page, two boxes appear under the heading: <ul style="list-style-type: none"> <li>Valve open when output lower than [*0.1 V]</li> <li>Valve open when output higher than [*0.1 V]</li> </ul> in which the values (between 0 and 99) must be written in the presence of which, the valve is open in one or the other direction. The setting is similar to that for the “Simple output function” but there are two voltage values. <b>Global – all valve closed</b> If the “subordinate” option is set, the output responds to the global object <Global All> All Valve closed; the box appears under the item on the ETS page Valve open when output higher than in which it is necessary to write the value (between 0 and 99) in the presence of which, the valve is open. The value in the box, divided by 10, corresponds to the output volts. If Output function is set as valve 6 ways two limits appear to set when the valve is open.	

Regarding the Output function, the relative settings are described in the table below.

KNX PARAMETER	SETTINGS
Output function	simple / 6-way valve / step/index / 3-speed fan-coil / interpolation
It sets the analog output to the chosen operating mode, that is, it defines the value that the output assumes in the event of telegrams coming from the bus. Each function makes the specific settings available on the ETS page. <b>Simple</b> The output goes to the voltage corresponding to the percentage value received by the telegram. The Simple setting includes the “Discretised” variant where the output assumes discrete values established by the parameter. The simple outlook can, if set from the relevant ETS page, respond to the interlock. <b>6-way valve</b> The 6-way valve is a dual valve circuit commutator that passes hot or cold fluid based on the voltage it reads at the input on a single port. Normally 0 to 3 V is switched to cold fluid, 3 to 7 V is closed and 7 to 10 V is switched to hot. The two objects associated and already described allow mixing of the fluids and assigning intermediate values. <b>Step/index</b> The output voltage increases/decreases by a fixed value (step) upon receipt of a 1-bit telegram, the logical value of which determines whether an increase or decrease will occur. From the corresponding ETS page it is possible to set 0..255 steps and up to 5 indices, defining for each a value assumed by the output. <b>Interpolation</b> A unit of measurement is selected for which, upon receiving an input value, the voltage output is activated proportionally. The parameters set the lower and upper limit of the interpolation interval and, with another specific parameter, these limits can be modified from the bus.	

For each Output function, in the menu under the item Analog Out x the ETS <Analog Out x> output function page becomes available, containing the specific settings. They all have in common the first setting “Output state at power ON”. The following parameters are available only when Output function is set as simple.

KNX PARAMETER	SETTINGS
<b>Limiter function</b>	disabled / enabled
<p>It limits the output voltage within a window defined by the minimum and maximum values that can be set in the respective boxes:</p> <ul style="list-style-type: none"> <li>• <b>Truncation</b> approximates values outside the minimum and maximum values;</li> <li>• <b>Linear</b> scales the output voltage set by the bus within the limits defined in the appropriate boxes, then to the difference between Maximum and Minimum (for example if Maximum=155/255 and Minimum=55/255, 0% is 55, 100% is 155 and 50% is equal to 105/255).</li> </ul> <p>Using the global object there are two limiters: through the global object is possible to switch between the two configurations; if both limiters are enabled, it is possible to select which one is active after download and the telegram value for switching.</p>	
<b>H/C logic function</b>	disabled / enabled
<p>By responding to the &lt;Global All&gt; Heat/Cool object, based on the settings made in the respective ETS page, it can invert the set interval, force a value (which can be defined in the Value box), decide the state of the logic after the download and the type of logic activation telegram.</p>	

#### Anti-lock function

Choosing the “enabled” option, the output controls the valve periodically according to the procedures to be defined on the ETS page accessible from the menu item <Analogic Out x> Anti-lock which is made available when Output function is set as a 6-way valve and in any case if, when present, the item Output is valve is set on Yes. The following parameters are available only when output is set to be valve.

KNX PARAMETER	SETTINGS
<b>Anti-lock function</b>	disabled / enabled
<p>It is used to “move” the solenoid valve to prevent it from becoming encrusted and blocked during long periods of inactivity. If this function is enabled, on the ETS page &lt;Analog Out x&gt; Anti-lock it is possible to set the parameters described here.</p> <p><b>Movement frequency</b> From the drop-down menu it is possible to select, between 1 and 16 days, with a granularity of 1 day, how long the period of inactivity may last before the valve performs an anti-lock cycle, which consists of an opening and subsequent closing after the time set with the following parameter.</p> <p><b>Movement time [min]</b> It defines (between 1 and 10 minutes) how long the activation of the valve in the anti-lock function must last.</p> <p><b>Minimum/maximum value</b> It defines the valve opening excursion through the range of voltage variation at the analog output that will control it.</p>	

#### Analog Out – Lock

KNX PARAMETER	SETTINGS
<b>Lock source</b>	local lock object global lock object local and global lock objects
<p>This parameter defines which type of KNX communication object is permitted to control the lock function. The lock function is a protective feature that prevents unauthorized or accidental changes to the output valve.</p>	

<b>Local lock object</b>	
The lock function is activated/deactivated only via the object “<Analog Out x> Lock”	
<b>Global lock object</b>	
The lock function is activated/deactivated only via the object “<Global All> Lock”	
<b>Local and global lock objects</b>	
The lock function is activated/deactivated via the object “<Analog Out x> Lock” and object “<Global All> Lock”	
<b>Telegram for lock activation</b>	telegram “0” / telegram “1”
This parameter defines which telegram is used to activate lock (opposite telegram is used to unlock).	
<b>Lock state after download</b>	unlocked / locked
This parameter defines the value of the lock state after download.	
<b>Lock state at power ON</b>	unlocked locked state before power OFF
This parameter defines the value of the lock state when the device is turned ON.	
<b>Automatic unlocking time (0 = never automatically unlock) [min]</b>	0 ÷ 255
This parameter defines the time delay after which the lock function is automatically deactivated (“unlocked”).	
<b>Action on lock / unlock</b>	none fixed value last value received (unlock only) last value before lock (unlock only)
This parameter defines the immediate control response that the output will execute when passing in locked/unlocked status. These settings determine whether the system simply prevents user input, or if it also forces a change in the operation to ensure efficiency or safety while locked.	

#### Analog Out – Feedback

KNX PARAMETER	SETTINGS
<b>Send on variation</b>	no send minimal 3, 5, 8, 10, 15, 20, 30, 40, 50 %
This parameter defines the threshold of change that output value it must exceed before the value is sent on the KNX bus.	
<b>Cyclic sending time</b>	no cyclic sending 1, 2, 3, 4, 5, 10, 15, 20, 30, 45 minutes 1, 1 and half, 2, 3, 4 hours
This parameter defines the time interval to send cyclically the output values on the bus.	

#### Analog Out Coupled – General Parameters

In case of coupled outputs, parameters are similar to the ones described for single output when configured as simple, see relative paragraphs.

KNX PARAMETER	SETTINGS
<b>Output state at power ON</b>	no action (0 V) set value restore value before power OFF
This parameter defines the action executed at power ON.	
<b>H/C at power ON</b>	cool / heat
Only in case of “set value”, this parameter defines the heat/cool mode of the function.	

<b>Value at power ON</b>	0 ÷ 255
Only in case of "set value", this parameter defines the actual value of the output.	
<b>Command telegram</b>	telegram "0" / telegram "1"
This parameter determines whether the output is activated with a telegram "1" (i.e. off = "0") or is activated with telegram "0" (i.e. off = "1")	

**Analog Out Coupled – Limiter**

Parameters of function limiter are the same already described for single output.

KNX PARAMETER	SETTINGS
<b>Apply limit for</b>	only cool / only heat / both
This parameter determines whether to apply the limit to the heating function, the cooling function, or both functions simultaneously.	

**Analog Out Coupled – Lock**

In case of coupled outputs, parameters are similar to the ones described for single output, see relative paragraphs.

KNX PARAMETER	SETTINGS
<b>HC on lock/unlock</b>	cool / heat
These parameters are active only when the relative parameters "Action on lock/unlock" are set to "fixed value." They define the specific operating mode (heat or cool) that output must immediately adopt when entering the locked/unlocked state.	
<b>Value on lock/unlock</b>	0 ÷ 255
These parameters are active only when the relative parameters "Action on lock/unlock" are set to "fixed value". They define the specific value that output must immediately adopt when entering the locked/unlocked state.	

**Voltage 0-10 V**

Voltage (V)	Value 0-255	Value 0-100%
0,0	0	0
0,5	13	5
1,0	26	10
1,5	38	15
2,0	51	20
2,5	64	25
3,0	77	30
3,5	89	35
4,0	102	40
4,5	115	45
5,0	128	50
5,5	140	55
6,0	153	60
6,5	166	65
7,0	179	70
7,5	191	75
8,0	204	80
8,5	217	85
9,0	230	90
9,5	242	95
10,0	255	100

**Voltage 1-10 V**

Voltage (V)	Value 0-255	Value 0-100%
1,0	0	0
1,5	14	6
2,0	28	11
2,5	43	17
3,0	57	22
3,5	71	28
4,0	85	33
4,5	99	39
5,0	113	44
5,5	128	50
6,0	142	56
6,5	156	61
7,0	170	67
7,5	184	72
8,0	198	78
8,5	213	83
9,0	227	89
9,5	241	94
10,0	255	100

**Voltage 2-10 V**

Voltage (V)	Value 0-255	Value 0-100%
2,0	0	0
2,5	16	6
3,0	32	13
3,5	48	19
4,0	64	25
4,5	80	31
5,0	96	38
5,5	112	44
6,0	128	50
6,5	143	56
7,0	159	63
7,5	175	69
8,0	191	75
8,5	207	81
9,0	223	88
9,5	239	94
10,0	255	100