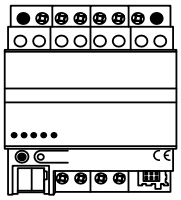
GB

Schneider Electric

Analogue actuator REG-K/4-gang

Operating instructions



Art. no. MTN682291

Necessary accessories

– Power supply REG, AC 24 V/1 A
(Art. no. MTN663529)

The actuator requires an external power supply to operate. This can supply a connected analogue actuator module or additional devices.

Accessories

– Analogue actuator module REG/4-gang
(Art. no. MTN682292)

For your safety

DANGER

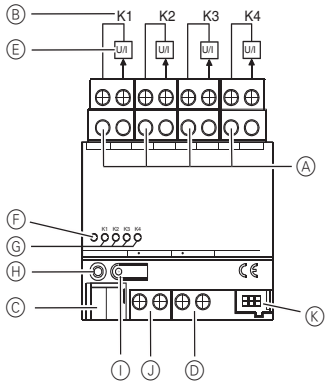
Risk of fatal injury from electrical current.
The unit may only be installed and connected by skilled electicians. Observe the regulations valid in the country of use, as well as the valid KNX guidelines.

Getting to know the actuator

The analogue actuator REG-K/4-gang (referred to below as the **actuator**) has 4 analogue outputs and converts KNX telegrams (1 byte and 2 bytes) into analogue output signals.

- These analogue output signals enable heating, air conditioning and ventilation system actuators to adapt their output variables based on bus information and to participate in control processes.
- The outputs are parameterised to voltage or current signals using software.
  Voltage outputs: 0 to 1 V, 0 to 10 V
  Current outputs: 0 to 20 mA, 4 to 20 mA
- Voltage outputs are monitored for short circuits.
- The output status is indicated by the status LEDs.
- The analogue actuator module 4-gang, art. no. MTN682292 can be used to expand the number of analogue outputs by 4 outputs to 8 outputs. Connections are made using a system plug.
- The output variables can be prioritised.
- Outputs that are not required can be switched off.
- For installation on DIN rails EN 50022.
- The bus is connected using a bus connecting terminal; a data rail is not necessary.

Connections, displays and operating elements



Ⓐ Reference potential for outputs K1 to K4
Ⓑ Analogue outputs K1 to K4
Ⓒ Bus connecting terminal
Ⓓ External supply voltage for Ⓔ
Ⓔ Analogue actuators (e.g. analogue actuators etc.)
Ⓕ Status LED, three colours (red, orange, green)
Ⓖ Status LEDs of the four analogue outputs (yellow)
Ⓗ Programming LED
Ⓘ Programming button
Ⓙ Auxiliary voltage connection
Ⓚ System connection, 6-pin for connecting an analogue actuator module

CAUTION

The device could become damaged.

Do not connect any electronic ballasts or electronic transformers with 1-10 V control input to the outputs!
Do not connect external voltages to the the outputs. Connected components must guarantee the safe isolation from other voltages.
The GND terminals must not be connected to analogue actuator module terminals with the same name (risk of destroying the device).

- Current outputs may be loaded up to max. 500 Ω.
- Voltage outputs must be loaded with at least 1 KΩ.
- The GND terminals of outputs K1 to K4 are interconnected internally.
- The respective output is switched off in the event of a short circuit of a voltage output between K1 to K4 and GND.

Mounting the actuator

It is not permitted to use non-approved interconnecting cables, their use may impair electrical safety and the proper functioning of the system.

An analogue actuator module is connected solely with a 6-pin system plug (supplied with the analogue actuator module).

In order to make connection convenient, two terminals for the power supply are available and are interconnected in pairs.

Installing the module

The following basic rules should be observed when installing an analogue module:

- A maximum of one analogue actuator module can be connected.
- One extension module can be exchanged for another of the same type - e.g. if a module is faulty - while the system is in operation (disconnect module from voltage!). After a module has been replaced, the actuator carries out a reset after approx. 25 seconds. This re-initialises all outputs on the actuator and the connected modules and resets them to their original status.
- It is not permitted to add or remove modules without adapting the configuration and downloading it into the actuator, as this may lead to system malfunctions.

Commissioning the actuator

The actuator carries out a module scan after being switched on for the first time (status LED: "Orange / On"). As a new device does not have a project as standard, the status LED switches to "Red/flashes quickly".

A connected analogue actuator module signals that it is ready for operation by switching its status LED to "Flashing quickly".

After a project has been loaded into the actuator, the status LED switched to "Green/On", the module switches its status LED off.

Status LED

Device status (three colours red, orange, green)

OFF	No power supply
Orange / on	Module scan by analogue actuator
Orange / flashes quickly	Analogue actuator module scan
Red / flashes slowly	Error: Undervoltage at the module connection
Red / flashes quickly	Error: No project / parameterisation error
Green / flashes slowly	Address allocation, module scan complete, configuration OK
LED green / flashes quickly	Parameter download in the module
LED green / on	Module scan complete, everything OK

Flashing slowly = 1/s; flashing quickly = 2/s

Output signals K1 to K4 (yellow):
LED off: The output signal is equal to zero

V6822-561-00 05/08

Technical data

Auxiliary voltage:	AC 24 V ±10 %
Current consumption:	max. 308 mA
KNX voltage:	DC 24 V (+8 V / -3 V)
KNX power consumption:	typ. 150 mW
Ambient temperature:	-5 °C to +45 °C
Storage/transport temp.:	-25 °C to +70 °C
Humidity	
Environment/storage/transport:	max. 93% relative humidity, no condensation
Connections	
Outputs, power supply:	Screw terminals
Single-core:	0.5 mm^2 to 4 mm^2
Finely stranded (without core end sleeve):	0.34 mm^2 to 4 mm^2
Finely stranded (with core end sleeve):	0.14 mm^2 to 2.5 mm^2
KNX:	Connecting and branch terminal
Analogue actuator module:	6-pin system plug
Analogue outputs	
Number:	4
Ranges:	0 to 1 V DC, 0 to 10 V DC, 0 to 20 mA DC, 4 to 20 mA DC
Voltage measurement impedance:	> 1 kΩ
Current measurement impedance:	< 500 Ω
Analogue actuator module power supply:	DC 24 V via system bus max. 80 mA
Type of protection:	IP 20 in accordance with EN 60529
Device width:	4 TE = approx. 72 mm

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If you have technical questions, please contact the Customer Care Center in your country.

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This product must be installed, connected and used in compliance with prevailing standards and/or installation regulations. As standards, specifications and designs develop from time to time, always ask for confirmation of the information given in this publication.

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Application: B008

Executable from mask version: 7.1
Number of addresses (max): 200 **dynamic table handling** Yes ☒ No ☐
Number of assignments (max): 200 **maximum lenght of table** 200

Communication objects 58

Object no.		Function	Name	DP type	Format	Flags
	0 … 3	Analog output	Input value output 1 … 4	9.0xx	2 bytes	C, W, T
	0 … 3	Analog output	Input value output 1 … 4	5.001	1 byte	C, W, T
	4 … 7	Analog output	Status output 1 … 4	9.0xx	2 bytes	C, R, T
	4 … 7	Analog output	Status output 1 … 4	5.001	1 byte	C, R, T
	8 … 15	Analog output	Forced control 1 / 2 output 1 … 4	1.001	1 bit	C, W, T
	16 … 19	Analog output	Switching output 1 … 4	1.001	1 bit	C, W, T
	20 … 23	Analog output	Dimming output 1 … 4	3.007	4 bits	C, W, T
	24 … 27	Analog output	Alarm output 1 … 4	1.001	1 bit	C, R, T
	29 … 32	Extension module	Input value output 5 … 8	9.0xx	2 bytes	C, W, T
	29 … 32	Extension module	Input value output 5 … 8	5.001	1 byte	C, W, T
	33 … 36	Extension module	Status output 5 … 8	9.0xx	2 bytes	C, R, T
	33 … 36	Extension module	Status output 5 … 8	5.001	1 byte	C, R, T
	37 … 44	Extension module	Forced control 1 / 2 output 5 … 8	1.001	1 bit	C, W, T
	45 … 48	Extension module	Switching output 5 … 8	1.001	1 bit	C, W, T
	49 … 52	Extension module	Dimming output 5 … 8	3.007	4 bits	C, W, T
	53 … 56	Extension module	Alarm output 5 … 8	1.001	1 bit	C, R, T
	57	Extension module	Alarm	1.001	1 bit	C, R, T

[1] The type of the objects depends on the setting of the "Input format" parameter.

[2] The objects of an output are visible only if the "Input format" parameter is set to "8 bits".

[3] The "Forced control" objects of an output are visible only if the "Forced control object" parameter is set to "Forced control active with...".

[4] The objects can receive either 8-bit or 16-bit values.

[5] Objects are visible only if the "Extension module present" parameter is set to "Yes".

Object description			
	0 … 3, 29 … 32	Input value output …	1-byte or 2-byte objects which can be used for presetting the output. In the 1-byte mode, a new input value can be adopted by the direct or by the dimming approach. The input object can be monitored during a specified time. (see also the object "Alarm output …")
	4 … 7 33 … 36	Status output …	1-byte object or 2-byte object for outputting of the actual ouput value.
	8 … 15 37 … 44	Forced control 1/2 output…	1-bit objects which can be used to switch the output by forced control to a parameterized value. After deactivation of the forced control mode , the output adopts the previous value. When both, forced copntrol 1 and force control 2 are active, forced control 1 has priority. The forced control objects can be monitored during a specified time. (see also the object "Alarm output …")
	16 … 19 45 … 48	Switching output …	1-bit objects which can be used to switch the output on (100%) or off. This object can be connected, for instance, with the 1-bit object of a dimming key. The object is available in the 8-bit mode only. When cyclical monitoring of the input value is active, the switching object is not monitored.
	20 …23 49 … 52	Dimming output …	4-bit object which can be used to increase / decrease the ouput value continuously with a dimming key. The dimming speed is presettable. As per the KNX standard "Brightness increase" is possible and "Brightness reduction" is not possible. When cyclical monitoring of the input value is active, the dimming object is not monitored.
	14 … 27 53 … 56	Alarm output …	1-bit object which is being set when the output is overloaded (output current exceeding 10 mA) in the 0 … 1 V or 0 … 10 V modes, or when the monitoring time has elapsed in case cyclical monitoring of the communication objects "Input value" and/or "Forced control..." is active.

1 Basic function

The analog output / analog actuator is designed to convert physical quantities (2 bytes) or relative values (1 byte) into analog voltages (0 … 1 V, 0 … 10 V) or currents (0 … 20 mA, 4 … 20 mA). This property can be used, for instance, to integrate HVAC components such as actuating drives for ventilation shutters or other devices into the KNX system.

In the basic setting, the outputs are shut off ("no function"). The parameter "Signal output..." can be used to select the desired voltage or current signal separately for each output. When an output is activated, the ETS displays further parameters and communication objects. An active output has an "Input value" and a "Status" communication object and – depending on its parameters – also further communication objects.

Each active output has the two parameter pages "Output … 1/2" and "Output … 2/2". The first of these parameter pages defines the desired input format (16-bit or 8-bit) and the response after a reset.

8-bit values can be used by a large number of KNX devices, but their resolution is limited. 16-bit values offer high resloution and very high flexibility in adapting themselves to the respective system function. They do require, however, a greater single effort in the elaboration of the parameters.

The second parameter page permits using forced-control objects for higher-priority control, time monitoring of the input objects and a dimming function when relative values are used (1-byte object).

2 Use of 16-bit values

Only in very few technical applications is the full range of values of the 2-byte floating point format really needed. On the other hand, there is a large variety of components converting a general analog value such as voltage or current with their own inherent conversion factor into the most different kinds of physical quantities.

To enable a simple and general conversion, the ETS displays three parameters, when the input format of an output is set to the "16-bit" format. These parameters are used to convert the input value in the 2-byte floating point format into the corresponding output signal.

The two parameters "Input value for 0% output value" and "Input value for 100% output value" are preset in such a way that – together with the common parameter "Factor of the input value" – they cover the desired range of values as fully as possible. For an internal resolution as high as as possible, a small factor should be chosen.

Examples:
To obtain a direct conversion of the input value into volts with an output signal of 0 … 10 V, the following parameters are recommended:

Input value for 0%:	0
Input value for 100%:	1000
Factor of input value:	0.01

To obtain a conversion of the input value into millivolts with an output signal of 0 … 10 V, the following parameters are recommended:

Input value for 0%:	0
Input value for 100%:	10000
Factor of input value:	1

In order to be able to use the angle directly as default value in case of a ventilation shutter drive with a mechanical actuation angle of 0 … 90° and an input voltage of 0 … 10 V, the following parameters are recommended:

Input value for 0%:	0
Input value for 100%:	9000
Factor of input value:	0.01

The same conversion in reverse is performed by the actuator for the communication object "Status". The status object transmits the new value in the following situations:

- When the object "Input value" has been assigned a new value different from the actual output value.
- When the output has adopted a new value because a higher priority command has been activated or deactivated by a "Forced control" object.
- When the output has received a new input telegram, which it does not execute because a forced control is active.
  Example
  The output is set to 9 volts by forced control. The "Input value" objects receives a value of 5 volts. This value is not adopted because of the forced control condition. The status object reports 9 volts. The new input value of 5 volts is internally stored and output when the forced control condition has ended. The status object reports 5 volts.
- When the monitoring time for the communication objects "Input value" and/or "Forced control" has elapsed.

3 Use of 8-bit values

When 8-bit values are used, the parameters "Input value for 0%", "Input value for 100%" and "Factor of the input value" are fixed and cannot be changed. The communication objects "Input value" and "Status" therefore correspond to datapoint type 5.001.

3.1 Dimming actuator function

When the format of the input object is set to "8-bit", the ETS displays in addition a 1-bit communication object and a 4-bit communication object for this output. With these objects, the output can be controlled by every touch sensor with a dimming function.

The 1-bit object "Switching" can be used to switch the output optionally on or off. When switched on, the output value adopts 100%.

With the 4-bit object, the output can be dimmed in accordance with datapoint type 3.007. The dimming speed depends on the two parameters "Time between 2 of 255 dimming steps, basis" and "Time between 2 of 255 dimming steps, factor". By default, the time for the range from 0% to 100% is approximately 5 seconds. The shortest time is about 2.5 seconds and the longest about 65,000 seconds (which corresponds to 1083 minutes or about 18 hours).

Depending on the parameter "Response to receiving a value", the output adopts a new value received via the 1-byte object either immediately ("direct approach") or it uses the same dimming speed as in case of control by the 4-bit object (dimming approach").

When the output receives a new value which is to be taken over by the dimming approach, the status object transmits the new value immediately after reception of the input telegram. In case of control via the 4-bit object, the status object transmits the new value when the dimming cycle is terminated.

4 Forced control

In the 8-bit and also in the 16-bit mode of operation, each output still has up to two communication objects permitting higher-priority control. In order to make use of these objects, the corresponding parameters "Forced-control object..." must be preset. In the basic configuration, these parameters are set to "non existing". For this reason, the ETS does not show these communication objects.

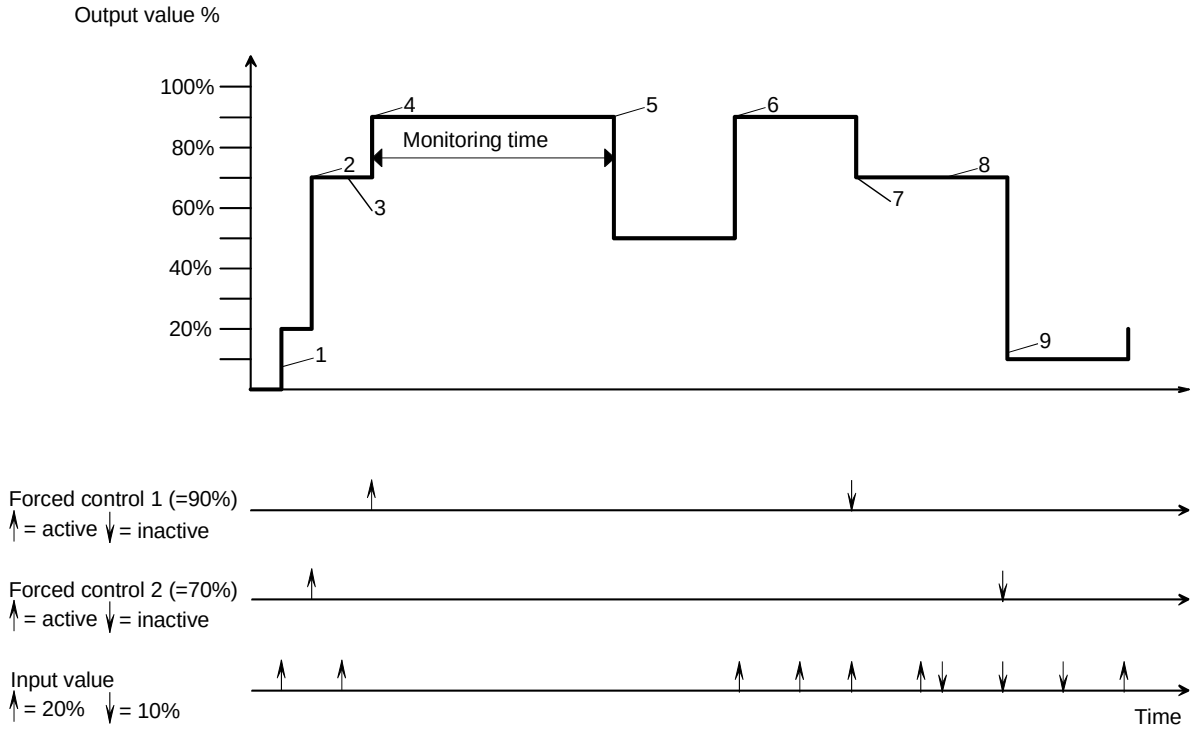
Forced control can be active, when the object value is either "1" or "0". The parameter "Output value with forced control" is then used to set a fixed value for the active state. When the "Forced control" object becomes inactive thereafter, the output automatically readopts the value that corresponds to the "Input value" object.

When both "Forced control" objects are active, the "Forced control 1" object internally has priority over the "Forced control 2" object.

5 Cyclical monitoring

In order to ensure that there is no output control failure, the actuator can monitor during a predefined time the input and / or the forced control mode for each of its outputs. In 8-bit operation, the communication objects "Switching" and "Dimming" are not monitored.

When this monitoring mode is activated, a time between 10 seconds and 2550 seconds (= 42.5 minutes) can be preset. If none of the communication objects receives a telegram during this time, the output adopts the value which can be defined in the parameter "Output value after end of monitoring cycle". With the communication object "Alarm output …", the output can additionally issue a message.



The diagram above shows the interaction of the communication objects "Input value" and "Forced control" in conjunction with a monitoring cycle. The arrows indicate the time when a telegram is transmitted.

1. When forced control is inactive, the state of the output is determined by the object "Input value".
2. When "Forced control 2" becomes active, the output adopts the parameterized value (in this case: 70%).
3. Telegrams addressed to the "Input value" object are not executed. Their value is, however, stored internally.
4. If activated, "Forced control 1" has higher priority (in this case: 90%).
5. When the monitoring time is exceeded, the output goes to the alarm state (n this case: 50%).
6. A new telegram addressed to the "Input value" object ends the alarm state. "Forced control 1" is again active.
7. When "Forced control 1" is terminated, "Forced control 2" is again active.
8. Interim changes of the "Input value" object are internally stored, but not executed.
9. When the forced-control state ends, the internally stored input value will be reactivated.

6 Connection with an analog output module / analog actuator module

The analog output module / analog actuator module permits doubling the number of outputs from 4 to 8.

6.1 Settings of the analog output module / analog actuator module

For the four channels of the analog output module / analog actuator module, the software offers the same settings as are applicable for the four inputs of the analog output / analog actuator.

In order to be able to use the extension module, the parameter "Extension module connected" on the general parameter page is to set to "Yes". The ETS will then show the corresponding parameters and communication objects as is the case for the outputs of the analog output / analog actuator.

Besides the communication objects "Alarm output …" of the individual channels, the analog output module / analog actuator module has another alarm communication object which sends a telegram of value "1" when the 24 V AC supply of the extension module fails. On return of the supply, the alarm is reset.

6.2 Electrical connection

When installing an analog output module / analog actuator module, the following points must be observed:

- Only one extension module can be connected to the device.
- The connection between the analog output / analog actuator and the extension module must be made only with the system connector supplied with the device.
- An analog output module / analog actuator module can be replaced (e.g. in case of defect) while the system is in operation (disconnect the voltage supply from the module). After the replacement, the analog output / analog actuator makes a reset after abt. 25 s. This action re-initializes all outputs and resets them to their original state.
- Removal or addition of modules without adapting the project and subsequent downloading into the analog output / analog actuator is not permitted as this will result in system malfunctions.
- The GND terminals of the analog output module / analog actuator module must not be connected to the corresponding terminals of another device, e.g. the analog output / analog actuator.
- The outputs of the analog output / analog actuator and of the analog output module / analog actuator module must not be connected to the 1 … 10 V interface of electronic ballasts or electronic transformers.
- All connected components must ensure safe separation from other voltages.

7 Commissioning and initialization

The analog output / analog actuators is programmed with the ETS.

8 Status indication

After initial start-up, the analog output / analog actuator performs a module scan (status LED: "orange / on"). Since a new device contains generally no project, the status LED switches thereafter to "red / flashing fast".

A connected extension module signals its ready-for-operation state by switching its status LED to "Fast flashing".

After a project has been loaded into the analog output / analog actuator, the status LED switches to "Green / on". The module switches its status LEDF off.

Parameters		
Description	**Values**	**Remarks**
General parameters		
Signal output …	**No function** 0 … 10V 0 … 1V 0 … 20mA 4 … 20mA	Each output can either have no function or otherwise work optionally as voltage or current source. When the output has no function, its communication objects and further parameters are hidden. When it is in use, the program displays two additional parameter pages for the output.
Extension module existing	**No** Yes	This parameter enables the alarm communication object and permits access to the parameters for the outputs 5 to 8
Output … 1/2		
Input format	**16-bit** 8-bit	Depending on this parameter, different communication objects are displayed for the input values and the status output. In the 8-bit mode, the output also has a 1-bit object and a 4-bit object. With these objects, it can work like a KNX dimming actuator.
Input format = 16-bit		
Input value for 0% output value Input value for 100% output value Factor of input value	-32768 … **0** … 32767 -32768 … **100** … 32767 **Input value * 0.01** Input value * 0.1 Input value * 1 Input value * 10 Input value * 100	The three parameters "Input value for 0%", "Input value for 100%" and "Factor of output value" can be used for adapting the output characteristics of the actuator to different input values. In order to achieve an internal resolution as high as possible, the two input values should be chosen such that they easily cover the desired range with a factor as small as possible.
Input format = 8-bit		
Input value for 0% output value Input value for 100% output value	**0** **255**	In the 8-bit mode, the range of input values is fixed. The function of the output corresponds in this case to the KNX standard for dimming actuators.
Input format = 8-bit or 16-bit		
Output value after initialization in % (0 … 100)	**0** … 100	Independent of the size of the input objects, this parameter fixes the output value during an initialization, for instance, after re-programming.

Response to bus voltage failure Output value in % (0 … 100)	**Last value** Output value in % **0**	When the supply voltage is present, the output can - in the event of bus voltage failure - either retain the last value or otherwise be set to a fixed vlaue. In this case, an additional parameter is displayed.
Response on return of bus voltage	**No response** State of initialization State as before bus voltage failure	On return of bus voltage, the output can optionally retain its actual value, preset the fixed initialization value or restore the condition existing before bus voltage failure.
Input object request on new start	**No** Yes	When this parameter is set to "Yes", the output can send a read request to the transmitting group address. Thereafter it sets its output to the value received as an answer to the request.
Output… 2/2		
Forced control object 1 (2)	**Not existing** Forced control active at "1" telegram Forced control active at "0" telegram	The two forced control objects permit controlling the output with a higher priority than the 1-byte or the 2-byte input object. When this parameter is set to "Not existing", the ETS does not display the corresponding 1-bit object. When the object is in use, the parameter determines at which value of the object the forced control is active. When the forced control object is switched to inactive, the output adopts the value that corresponds to the object "Input value". If both forced control objects are active, forced control object 1 has the higher priority.
Output value in case of forced control 1(2) in %	0 … **50** … 100	This parameter determines the output value, if the corresponding forced control object is active.
Cyclical monitoring	**No monitoring** Input value Forced control Input value or forced control	The output can monitor the "Input value" object and / or the "Forced control" objects during a certain time. The non-reception of a telegram within the time defined hereafter is evaluated by the output as an error. In this case, the object "Alarm output …" can send a telegram with value 1 and the output adopts the value that is preset with the parameter "Output value after exceeding of the monitoring time".

Time factor for cylical monitoring (1 … 255, Base = 10 s)	**6**	Together with the fixed time base, this parameter determines the monitoring time of the output.
Output value after exceeding of the monitoring time in %	**0** … 100	On exceeding of the monitoring time, the output adopts this value.
Input format = 8-bit		
Time between 2 of 255 dimming steps - base Time between 2 of 255 dimming steps - factor (1 … 255)	**10 ms** **2**	In the 8-bit mode, these two parameters determine the dimming speed used by the output when controlled via the 4-bit object or when the following parameter is set to ""Dimming approach" and when the output has received a new input value.
Response on reception of value	**Direct approach** Dimming approach	In the dimming actuator mode, the output can adopt new 1-byte values either directly and immediately or approach them with the usual dimming speed.
Output x 1/2 like output 1 1/2		
Output x 2/2 like output 1 2/2		