

# **HEATING ACTUATOR**

## CHS

User Manual:

CHS-04.01

CHS-06.01

CHS-12.01

Application Program: ver. 1.0

User Manual: ver. 1.0

[module-electronic.ru](http://module-electronic.ru)

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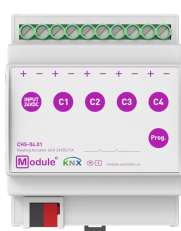
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# 1 BASIC INFORMATION

The heating actuator is designed to control water heating systems with thermoelectric valves with a supply voltage of 24V DC.

The device is available in three versions, which differ in the number of independent channels and design:

- CHS-04.01 (4 channels, designed for installation on a DIN rail 35mm);
  - CHS-06.01 (6 channels, designed for wall mounting);
  - CHS-12.01 (12 channels, designed for installation on a DIN rail 35mm ).
- Independent outputs 24V DC
  - Ability to connect up to 3 valves per output
  - LED indication of output status
  - Valve NO / NC operation mode selection
  - Function of protection of valves against «sticking»
  - Short circuit and overload protection
  - Saving settings during a KNX power failure
  - Power supply via KNX bus
  - Valves powered by external 24V DC power supply



CHS-04.01



CHS-06.01



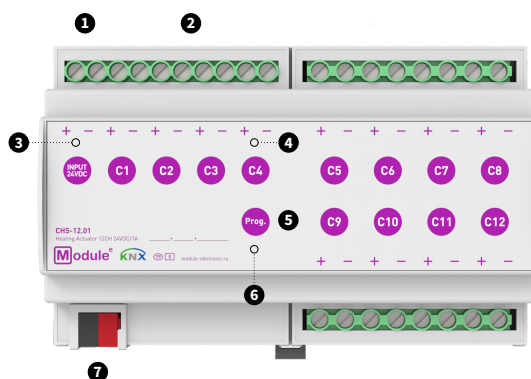
CHS-12.01

## 1.1 SPECIFICATIONS

Device model	CHS-04.01	CHS-06.01	CHS-12.01
<b>Outputs (control channels)</b>			
Number of outputs	4	6	12
Output type	MOSFET		
Rated current per output	1A/24V DC		
Number of connected valves to the output	up to 3 pcs.		
Short circuit protection	Yes		
Overload protection	Yes		
Cross-section of the connected wire to the screw terminals	0,5-4mm <sup>2</sup>		
<b>KNX interface</b>			
Specification	TP-256		
Available application software	ETS 5		
KNX connector	4-wire EIB connector (PUSH WIRE spring clips) for standard cable TP1 0,8mm Ø		
Power supply	via KNX bus		
Consumption on the KNX bus (29V DC)	< 5mA < 150mW	< 5mA < 150mW	< 5mA < 150mW
Valve power	External power supply 24V DC		
Operation temperature	0°C .. + 45°C		
Operation humidity	5 .. 95% (no condensation)		
Degree of protection	IP 20, clean environment	IP 64, clean environment	IP 20, clean environment
Mounting type	DIN rail 35mm	Wall mounting	DIN rail 35mm
Dimensions	71,3 x 90,5 x 62mm (4TE)	145 x 71,5 x 55mm	142,3 x 90,5 x 62mm (8TE)
Weight	135g	235g	254g

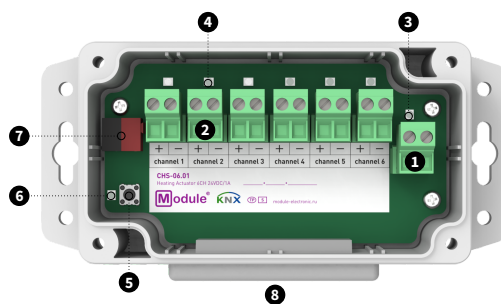
## 1.2 APPEARANCE

Appearance of the CHS-12.01 actuator (other versions for mounting on a DIN rail differ only in the number of channels (outputs)).

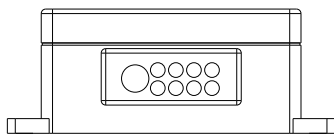
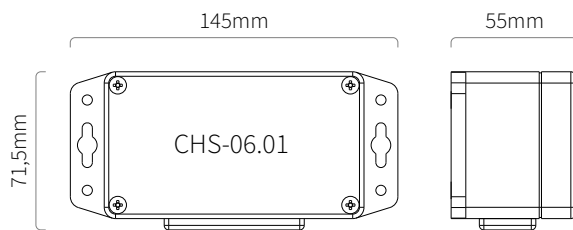
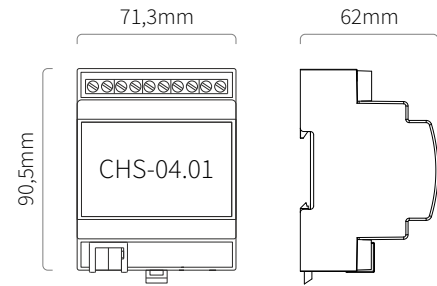
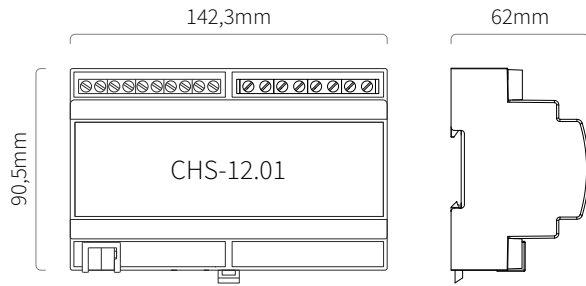


- 1. Input 24B DC
- 2. Outputs 24B DC
- 3. External power indicator LED
- 4. Output status indicator LED
- 5. Programming button
- 6. Programming LED
- 7. KNX connector

Appearance of the actuator CHS-06.01



- 1. Input 24B DC
- 2. Outputs 24B DC
- 3. External power indicator LED
- 4. Output status indicator LED
- 5. Programming button
- 6. Programming LED
- 7. KNX connector
- 8. Cable glands

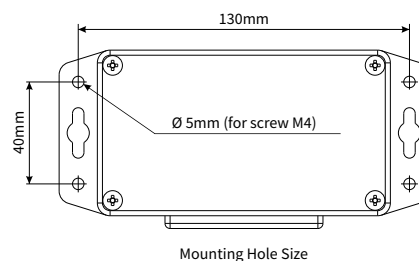
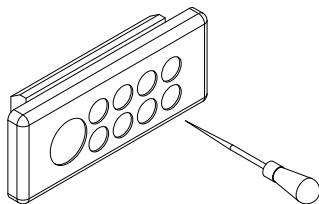


## 1.3 INSTALLATION AND CONNECTION

### INSTALLATION CHS-06.01

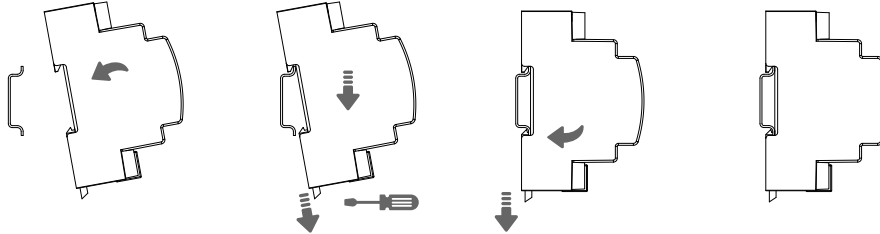


before entering the cable Make a puncture in the center of the pressure seal membrane with an awl

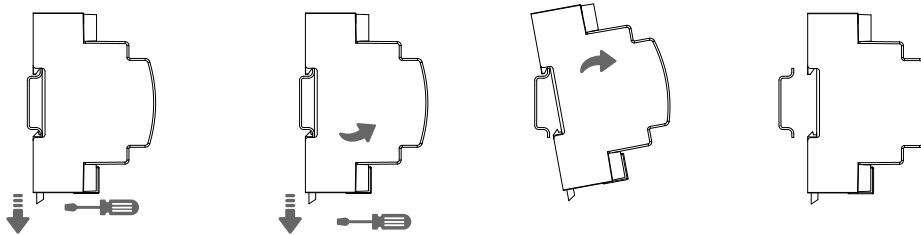


## INSTALLATION CHS-12.01 OR CHS-04.01

Attaching to DIN rail

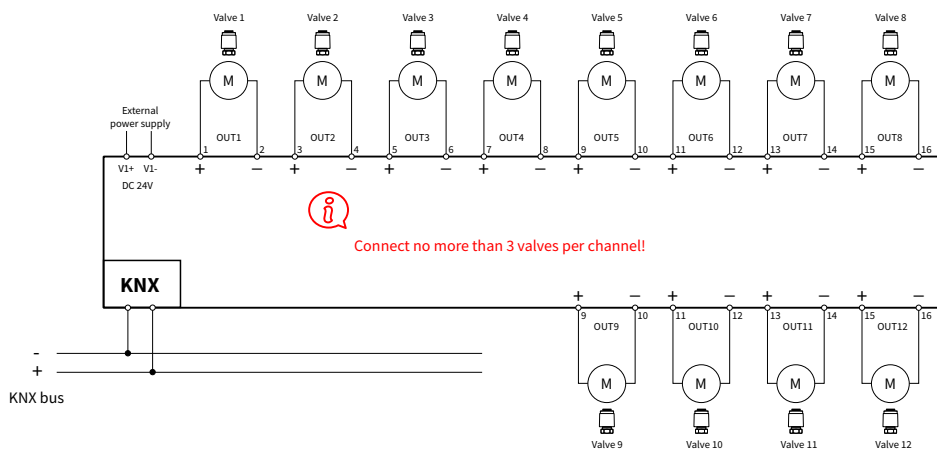


Removing from DIN rail



## WIRING DIAGRAMS

Wiring example CHS-12.01 (other versions are connected in the same way)



**ATTENTION!** Installation and connection of the device to the mains must only be carried out by qualified personnel! Be sure to turn off the power before installing or removing the device! Even when the device is turned off, the output terminals can be live! Do not connect to the outputs a load that exceeds the recommended values! The design of the device meets the requirements of electrical safety according to GOST 12.2.007.0-75.

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## 2 TERMS AND DEFINITIONS

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### 2.1 EXTERNAL SENSOR

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An external sensor is a third-party device capable of measuring temperature and transmitting readings via the KNX bus.

### 2.2 TEMPERATURE SETPOINT

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The temperature setpoint is a parameter that directly controls the temperature. Parameter 2.11 «Comfort mode setpoint» is used to set the setpoint value for «Comfort» mode. Parameters 2.12 «Standby mode offset» and 2.13 «Economy mode offset» change the value of the current setting («Actual setpoint») relative to the comfort setpoint by the value of the corresponding offset: decrease when controlling the heater or increase when controlling the cooler.



## 2.4 PI CONTROL (PI)

In the proportional-integral (PI) control algorithm, the magnitude of the control action on the controlled object depends on the difference (discrepancy) between the setpoint and the temperature of the object. The algorithm takes into account both the proportional (P) and the integral component (I), i.e., the residual value accumulated over time, which enables to compensate for the systematic regulation error due to heat losses at the object.

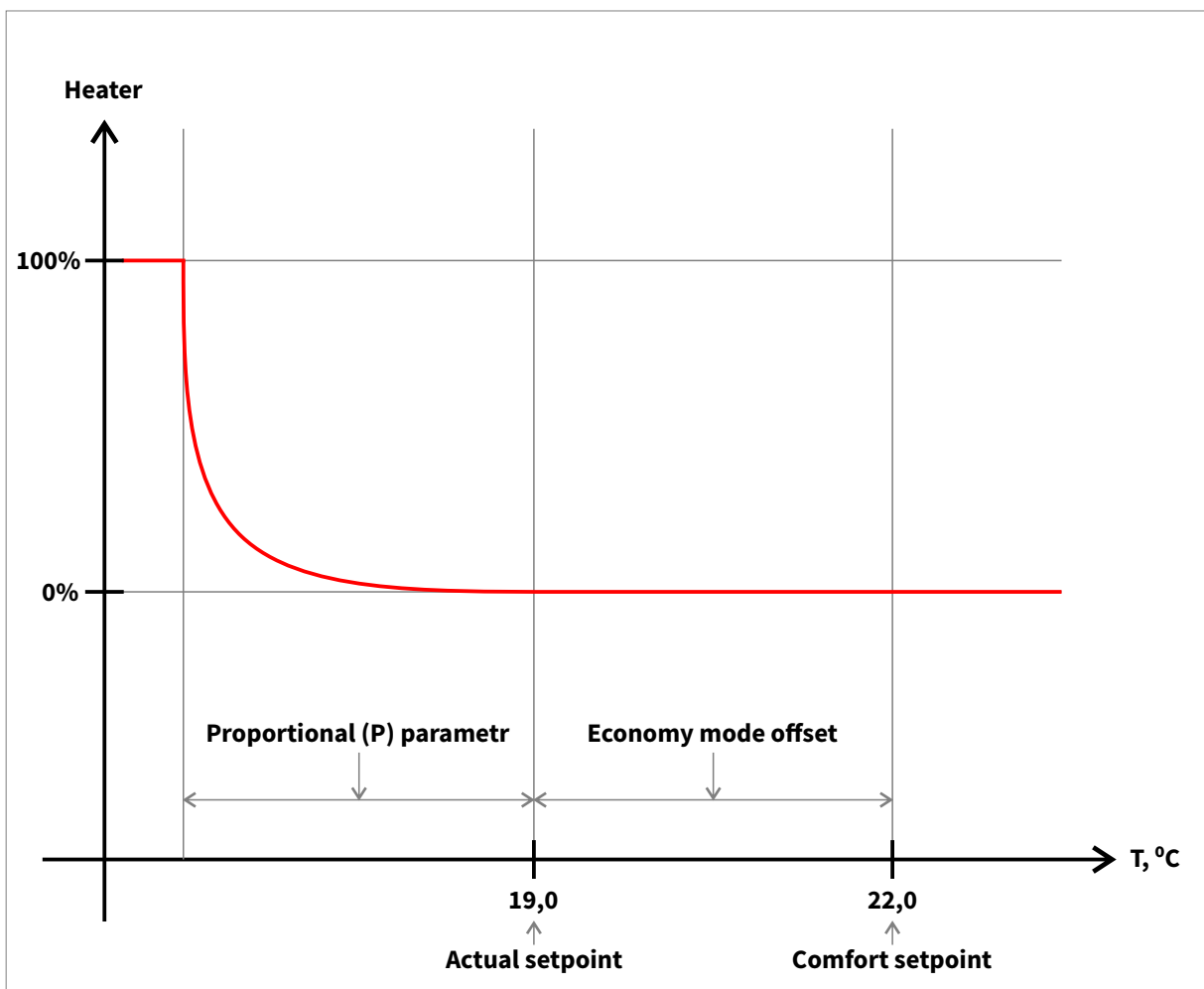


Figure 2. PI temperature control algorithm

The proportional (P) parameter of the PI control algorithm is determined by the power of the heater (cooler) and is numerically equal to the residual value, above which the control action reaches 100%.

The integral (I) parameter of the PI control algorithm is determined by the inertia of the control object.

## 2.5 PULSE WIDTH MODULATION (PWM)

With the PI-PWM control algorithm and in the proportional actuator mode, the magnitude of the control action is presented in percent, but the control action is sent to the controlled object by pulse-width modulation: pulse duty ratio is proportional to the magnitude of the control action.

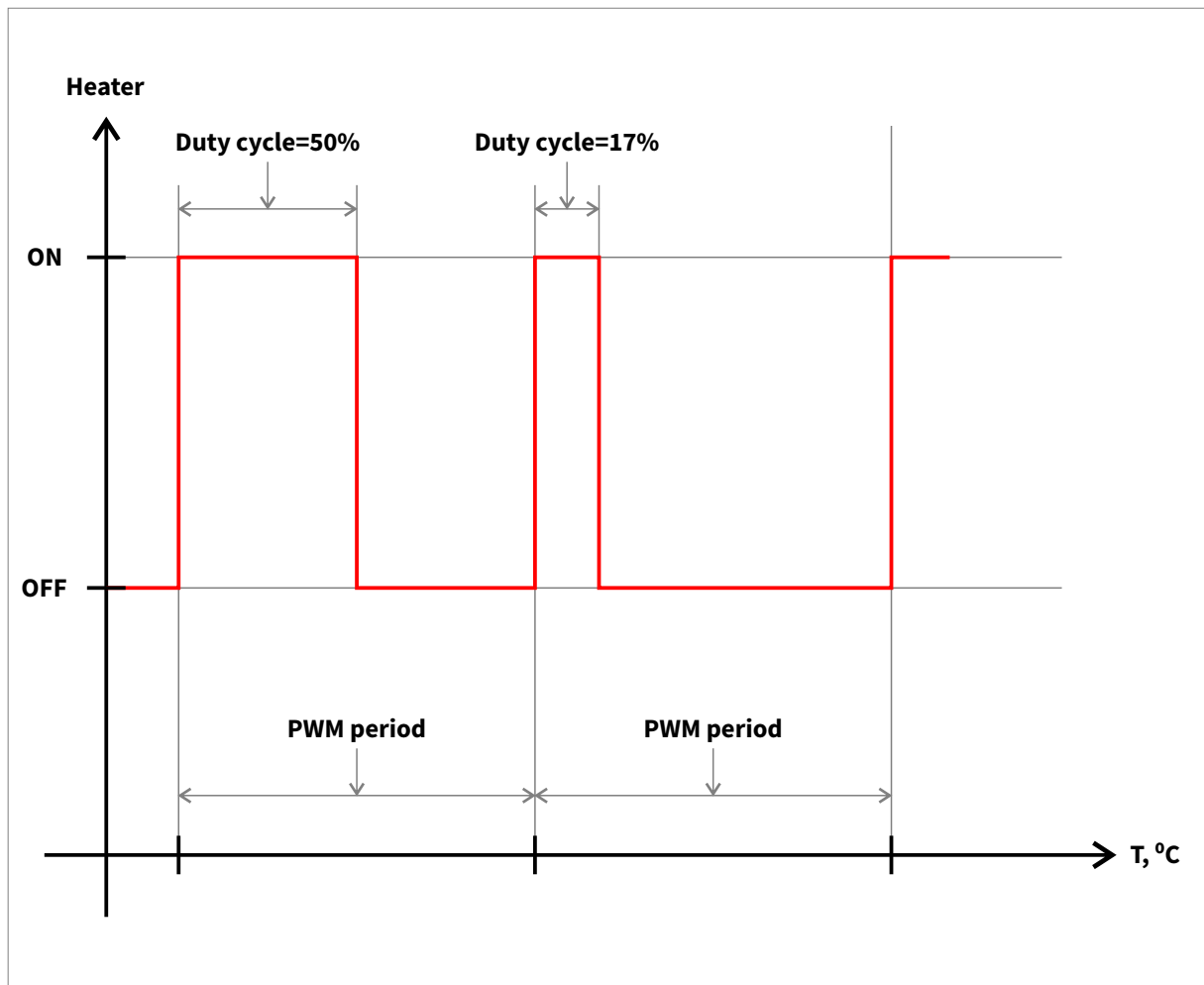


Figure 3. PWM control algorithm

### 3 HOW TO CHOOSE A DEVICE VERSION

The option menu allows to select one of three device models.

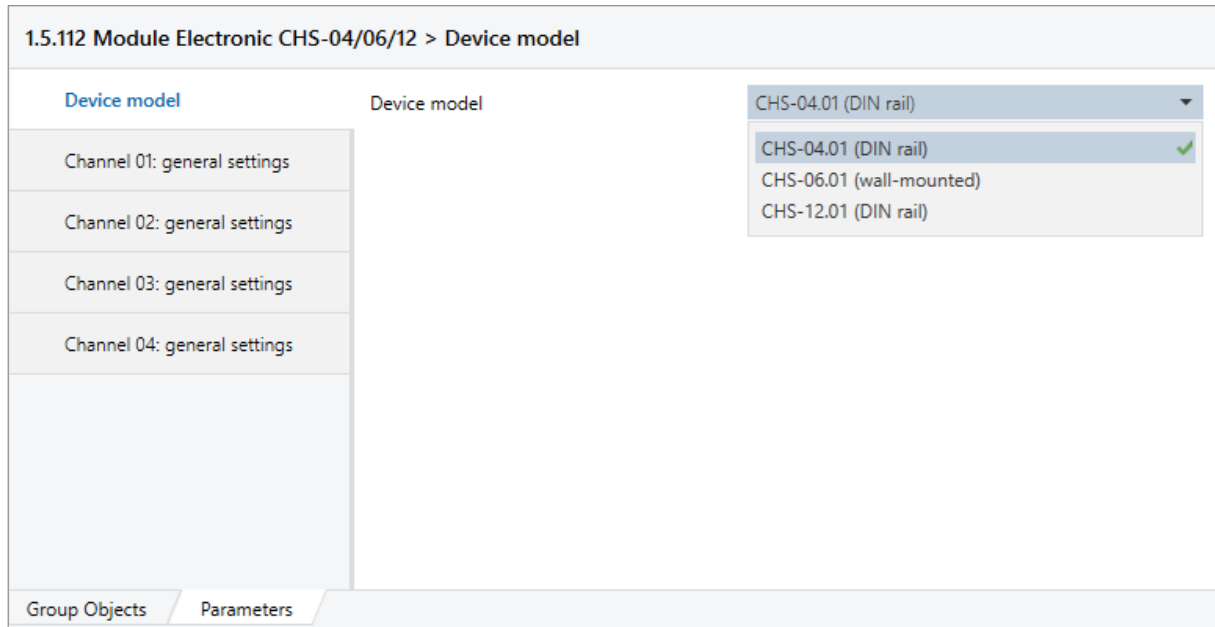


Figure 4. Tab «Device model»

Depending on the selected version, the corresponding number of tabs for each of the channels available in the selected version is displayed in the settings menu.

## 4 SETTINGS

The device settings menu consists of individual tabs for each channel.

The screenshot shows the settings interface for a device. The title bar reads '1.5.112 Module Electronic CHS-04/06/12 > Channel 01: general settings'. On the left, there is a vertical list of tabs: 'Device model', 'Channel 01: general settings' (which is highlighted in blue), 'Channel 01: controller', 'Channel 02: general settings', 'Channel 03: general settings', and 'Channel 04: general settings'. At the bottom left, there are two tabs: 'Group Objects' and 'Parameters'. The main content area contains the following settings:

- Channel activity:** Radio buttons for 'Inactive' and 'Active'. 'Active' is selected.
- Valve type:** Radio buttons for 'Normally closed' and 'Normally open'. 'Normally closed' is selected.
- Valve protection:** Radio buttons for 'Off' and 'On'. 'Off' is selected.
- Send actual output state on change:** Radio buttons for 'Don't send' and 'Send'. 'Send' is selected.
- Send actual output state every (minutes, 0 - don't send periodically):** A numeric input field containing '0'.
- "No data" failure after no command/temperature telegrams during (minutes, 0 - don't check):** A numeric input field containing '1'.
- Channel locking:** Radio buttons for 'Disabled' and 'Enabled'. 'Enabled' is selected.
- Output state when channel is locked:** Radio buttons for 'Off' and 'On'. 'Off' is selected.
- Channel function:** Radio buttons for 'Actuator' and 'Controller'. 'Controller' is selected.

Figure 5. Tab «Channel 01: general settings»

### 4.1 CHANNEL ACTIVITY

The parameter turns the channel off («Inactive») or on («Active»). In the «Active» position, the remaining channel settings are displayed.

### 4.2 VALVE TYPE

The parameter sets the type of the valve actuator: «Normally closed» or «Normally open».

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## 4.3 VALVE PROTECTION

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Some valve models may «stick» if they remain in one of the extreme positions for a long time. To eliminate this, the device is equipped with a mechanism for protecting valves from sticking: valves of the channels for which this parameter is «On», are switched to the position opposite to the current one for 10 minutes once every 24 hours. After 10 minutes, these valves return to the position preceding the activation of the protection mode.

If this parameter is «Off», this channel does not participate in protection mode.

---

## 4.4 SEND ACTUAL OUTPUT STATE ON CHANGE

---

The parameter allows to configure sending the current state of the channel when it changes («Send»). If «Don't send» is selected, nothing will be sent at its change.

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## 4.5 SEND ACTUAL OUTPUT STATE PERIODICALLY

---

When setting the value of this parameter from 1 to 60, the device will periodically (once in the specified number of minutes) send the current state of the channel. If the parameter value is zero, periodic sending of the current state is disabled.

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## 4.6 «NO DATA» FAILURE AFTER NO CAMMAND/TEMPERATURE TELEGRAMS

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When the value of this parameter is set to 1 to 60, the device will control the receipt of control commands or temperature readings, and if the same are absent for a specified number of minutes, the device will enter the alarm state and send a telegram «No data» alarm, type 1.005 «Alarm». Also the settings for the response to the alarm appear on the settings tabs for the parameters «Channel 01: actuator» and «Channel 01: controller». If the parameter value is zero, receipt of control commands is not monitored.

---

## 4.7 CHANNEL LOCKING

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In the «Enabled» position, the «Channel locking» communication object becomes available, to which the device can respond. Also, the status setting option for locking appears.

## 4.8 OUTPUT STATE WHEN CHANNEL IS LOCKED

---

Sets the channel state when locked.

## 4.9 CHANNEL FUNCTION

---

Sets the channel operation mode:

«Actuator»: the device receives control actions from a third-party temperature controller via the KNX bus;

«Controller»: the device receives temperature values from a third-party sensor via the KNX bus and performs temperature control independently.

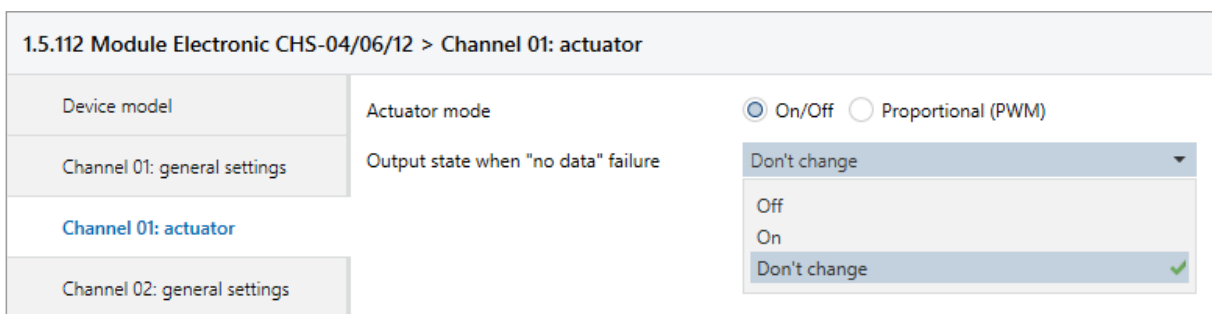


Figure 6. Tab «Channel 01: actuator», «On/Off» control method

## 4.10 ACTUATOR MODE

---

Sets the actuator (valve) control mode:

«On/Off»: the device receives control actions in the form of one-bit «On/Off» telegrams via the KNX bus and directly turns the valve on/off;

«Proportional (PWM)»: the device receives control actions via the KNX bus as a percentage of the maximum power in the form of single-byte «Percent (0..100%)» telegrams and turns the valve on/off using the pulse-width modulation algorithm (ref. to p. 2.5)

## 4.11 OUTPUT STATE WHEN «NO DATA» FAILURE

---

Sets the output state during a long-term (specified by parameter 4.6) failure to receive telegrams with control actions. If «Don't change» is selected, a long-term absence of telegrams does not affect the operation of the device.

1.5.112 Module Electronic CHS-04/06/12 > Channel 01: actuator		
Device model	Actuator mode	<input type="radio"/> On/Off <input checked="" type="radio"/> Proportional (PWM)
Channel 01: general settings	PWM period (minutes)	10
Channel 01: actuator	Minimum actuating value (%)	0
Channel 02: general settings	Maximum actuating value (%)	100
Channel 03: general settings	Actuating value when "no data" failure (%; -1 = don't change)	-1

Figure 7. Tab «Channel 01: actuator», control method «Proportional (PWM)»

## 4.12 PWM PERIOD

---

Sets the period of the control PWM sequence (ref. to p. 2.5). The range of values is 1..255 minutes.

## 4.13 MINIMUM ACTUATING VALUE

---

Sets the minimum value for actuating the PWM sequence (ref. to p. 2.5). Upon receipt of telegrams with values less than the minimum one, the device generates a PWM sequence with a minimum value. The range of values is 0...100%.

## 4.14 MAXIMUM ACTUATING VALUE

---

Sets the maximum value for actuating the PWM sequence (ref. to p. 2.5). Upon receipt of telegrams with values greater than the maximum one, the device generates a PWM sequence with a maximum value. The range of values is 0...100%.

## 4.15 ACTUATING VALUE WHEN «NO DATA» FAILURE

---

Sets the value of actuating the PWM sequence (ref. to p. 2.5) upon a long-term (specified by parameter 4.6) failure to receive telegrams with control actions. If the parameter value is «-1» («Don't change»), a long-term absence of telegrams does not affect the operation of the device.

1.5.112 Module Electronic CHS-04/06/12 > Channel 01: controller

Device model	Controller type	<input type="radio"/> Cooler <input checked="" type="radio"/> Heater
Channel 01: general settings	"Comfort" mode setpoint (°C)	25
<b>Channel 01: controller</b>	"Standby" mode offset (°C)	0
Channel 02: general settings	"Economy" mode offset (°C)	0
Channel 03: general settings	Mode on reset	Restore previous mode
Channel 04: general settings	Heat/frost alarms	<input type="radio"/> Don't send <input checked="" type="radio"/> Send
	- when temperature < (°C)	0
	- when temperature > (°C)	35
	Controller mode	<input checked="" type="radio"/> 2-points <input type="radio"/> PI (PWM)
	Hysteresis (* 0,1 °C)	5
	Output state when "no data" failure	Don't change
		Off
		On
		Don't change <input checked="" type="checkbox"/>

Group Objects Parameters

Figure 8. Tab «Channel 01: controller», temperature control method «2-points»

## 4.16 CONTROLLER TYPE

The parameter allows to set the controller operation mode: control of the air conditioning system or heating system.

If «Cooler» is selected, the device controls the air conditioner:

- when the temperature rises above a preset value, it sends a control command «Turn on», when the temperature drops - «Turn off»;
- offsets of the standby and economy modes setpoints are added to the comfort mode setting.

If «Heater» is selected, the device controls the heating:

- when the temperature drops below a preset value, it sends a control command «Turn on», when the temperature drops - «Turn off»;
  - offsets of the standby and economy modes setpoints are deducted from the comfort mode settings.
- Ref. to p. 2.2 for more details.

---

## 4.17 «COMFORT» MODE SETPOINT

---

The parameter allows to set the comfort mode setpoint (ref. to p. 2.2 for more details).

Allowable values are +15.0 °C .. +35.0 °C, increment is 0.1 °C.

---

## 4.18 «STANDBY» MODE OFFSET

---

The parameter allows to set the offset of the current setting in standby mode relative to the comfort mode setpoint. The current setpoint changes to the indicated value:

- increases, if parameter 4.16 «Controller type» is set to «Cooler»;
- decreases, if parameter 4.16 «Controller type» is set to «Heater».

Allowable values are 0 .. 25 °C .. +35.0 °C, increment is 1 °C.

---

## 4.19 ECONOMY MODE OFFSET

---

The parameter allows to set the offset of the current setpoint in economy mode relative to the comfort mode setpoint. The current setpoint changes to the indicated value:

- increases, if parameter 4.16 «Controller type» is set to «Cooler»;
- decreases, if parameter 4.16 «Controller type» is set to «Heater».

Allowable values are 0 .. 25 °C .. +35.0 °C, increment is 1 °C.

---

## 4.20 MODE ON RESET

---

The parameter allows to set the behavior of the device in the event of a reboot, power failure, and similar situations.

If «Restore previous mode» is selected, the device remembers the operating mode in non-volatile memory and after restoration of the supply voltage recovers in the same mode as before.

If «Set mode Comfort», «Set mode Standby» or «Set mode Economy» are selected, the device is forcibly switched to one of the above modes after the restoration of the supply voltage.

## 4.21 HEAD/FROST ALARMS

---

If «Don't send» is selected, the control of the current temperature exceeding the permissible limits is disabled.

If «Send» is selected, the control of the current temperature exceeding the permissible limits is enabled, and alarms are sent. The parameters 4.22 «When temperature <» and 4.23 «When temperature >», as well as CommObjects 5.13 «Frost alarm» and 5.14 «Heat alarm» become available.

## 4.22 WHEN TEMPERATURE <

---

The parameter allows to set the lower allowable temperature. If the temperature drops below this value, the device sends an alarm, provided that the parameter 4.21 «Heat/Frost alarms» is set to the «Send» mode.

The value is indicated in °C. The range of allowable values is -3 .. +15, increment is 1.

## 4.23 WHEN TEMPERATURE >

---

The parameter allows to set the upper allowable temperature. If the temperature rises above this value, the device sends an alarm, provided that the parameter 4.21 «Heat/Frost alarms» is set to the «Send» mode.

The value is indicated in °C. The range of allowable values is +25 .. +50, increment is 1.

## 4.24 CONTROLLER MODE

---

The parameter allows to set the temperature control mode.

If «2-points» is selected, the controller operates in two-point mode (ref. to p. 2.3 for more details).

If «PI (PWM)» is selected, the controller operates in the PI-control mode, the control action is sent in the form of a PWM sequence. Ref. to p. 2.4 and p. 2.5 for more details.

## 4.25 HYSTERESIS

---

The parameter allows to set the hysteresis of the controller two-point algorithm. Ref. to p. 2.3 for more details.

The value is indicated in 1/10 °C, the range of allowable values is 0..50 (0.0 °C.. 5.0 °C), increment is 0.1 °C.

## 4.26 OUTPUT STATE WHEN «NO DATA» FAILURE

Sets the output state during a long-term (specified by parameter 4.6) failure to receive telegrams with temperature values. If «Don't change» is selected, a long-term absence of telegrams does not affect the operation of the device.

1.5.112 Module Electronic CHS-04/06/12 > Channel 01: controller		
Device model	Controller type	<input type="radio"/> Cooler <input checked="" type="radio"/> Heater
Channel 01: general settings	"Comfort" mode setpoint (°C)	25
<b>Channel 01: controller</b>	"Standby" mode offset (°C)	0
Channel 02: general settings	"Economy" mode offset (°C)	0
Channel 03: general settings	Mode on reset	Restore previous mode
Channel 04: general settings	Heat/frost alarms	<input type="radio"/> Don't send <input checked="" type="radio"/> Send
	- when temperature < (°C)	0
	- when temperature > (°C)	35
	Controller mode	<input type="radio"/> 2-points <input checked="" type="radio"/> PI (PWM)
	Heating system	Custom parameters
	Proportional range (°C)	4
	Integration period (minutes)	60
	PWM period (minutes)	10
	Minimum actuating value (%)	0
	Maximum actuating value (%)	100
	Actuating value when "no data" failure (%; -1 = don't change)	-1

Figure 9. Tab «Channel 01: controller», temperature control method «PI (PWM)»

## 4.27 PWM PERIOD

Sets the period of the control PWM sequence (ref. to p. 2.5). The range of values is 1..255 minutes.

---

## 4.28 MINIMUM ACTUATING VALUE

---

Sets the minimum value for actuating the PWM sequence (ref. to p. 2.5).

If the value of the control action calculated by the temperature control algorithm is less than the minimum one, the device generates a PWM sequence with a minimum value.

The range of values is 0...100%.

---

## 4.29 MAXIMUM ACTUATING VALUE

---

Sets the maximum value for actuating the PWM sequence (ref. to p. 2.5).

If the value of the control action calculated by the temperature control algorithm is greater than the maximum one, the device generates a PWM sequence with the maximum value.

The range of values is 0...100%.

---

## 4.30 ACTUATING VALUE WHEN «NO DATA» FAILURE

---

Sets the value of actuating the PWM sequence (ref. to p. 2.5) for a long-term (specified by parameter 4.6) failure to receive telegrams with temperature values. If the parameter value is «-1» («Don't change»), a long-term absence of telegrams does not affect the operation of the device.

## 5 COMMUNICATION OBJECTS

Depending on the settings, the device activates and supports up to 15 independent CommObjects for each of the 6 channels. A communication object common to all channels, which alarms of a failure of the valves external power supply, is also available.

Number ^	Name	Object Function	Description	Group Address	Length	C	R	W	T	U	Data Type	Priority
1	Channel 01	Command (on/off)			1 bit	C	-	W	-	U	switch	Low
13	Channel 01	Command (%)			1 byte	C	-	W	-	U	percentage (0..100%)	Low
25	Channel 01	Current state (on/off)			1 bit	C	R	-	T	-	switch	Low
37	Channel 01	Current proportional value (%)			1 byte	C	R	-	T	-	percentage (0..100%)	Low
49	Channel 01	Channel locking			1 bit	C	-	W	-	U	switch	Low
61	Channel 01	"No data" alarm			1 bit	C	R	-	T	-	alarm	Low
73	Channel 01	External temperature			2 bytes	C	-	W	-	U	temperature (°C)	Low
85	Channel 01	Comfort setpoint			2 bytes	C	R	W	T	U	temperature (°C)	Low
97	Channel 01	Actual setpoint			2 bytes	C	R	-	T	-	temperature (°C)	Low
109	Channel 01	Comfort mode			1 bit	C	R	W	T	U	switch	Low
121	Channel 01	Standby mode			1 bit	C	R	W	T	U	switch	Low
133	Channel 01	Economy mode			1 bit	C	R	W	T	U	switch	Low
145	Channel 01	HVAC mode			1 byte	C	R	W	T	U	HVAC mode	Low
181	Channel 01	Frost alarm			1 bit	C	R	-	T	-	alarm	Low
193	Channel 01	Heat alarm			1 bit	C	R	-	T	-	alarm	Low
205	External power fail	External power fail			1 bit	C	R	-	T	-	alarm	Low

Figure 10. Communication objects. The maximum set of objects for one channel (Channel 1) is shown.

### 5.1 COMMAND (ON/OFF)

It is used to control the load in the «Actuator (on/off)» mode.

The object is write-only.

The data format is DPT 1.001 (1-bit «On/Off» value).

### 5.2 COMMAND (%)

It is used to control the load in the «Actuator (PWM)» mode.

The object is write-only.

The data format is DPT 5.001 (1-bit value, 0 = 0%..255 = 100%).

---

### 5.3 CURRENT STATE (ON/OFF)

---

Allows to read the current state of the load.

The object is read-only.

The data format is DPT 1.001 (1-bit «On/Off» value).

---

### 5.4 CURRENT PROPORTIONAL VALUE (%)

---

Allows to read the current value of the control action in proportional control modes («Actuator (PWM)» and «PI controller (PWM)»).

The object is read-only.

The data format is DPT 5.001 (1-bit value, 0 = 0%..255 = 100%).

---

### 5.5 CHANNEL LOCKING

---

It is used to lock/unlock the channel.

The object is write-only.

The data format is DPT 1.001 (1-bit «On/Off» value).

---

### 5.6 «NO DATA ALARM»

---

Through this communication object, the device reports a prolonged absence of incoming control actions or temperature readings.

The object is read-only.

The data format is DPT 1.005 (1-bit «Alarm/No alarm» value).

---

### 5.7 EXTERNAL TEMPERATURE

---

It is used to receive data from third-party devices that are able to measure temperature and send it via KNX bus.

It becomes available when the controller mode is selected. The object is write-only.

The data format is DPT 9.001 (16-bit numeric floating-point number, values are presented in 1/100 °C).

---

## 5.8 COMFORT SETPOINT

---

Allows to set/read the value of the comfort mode setpoint. Ref. to p. 2.2 for more details.

It becomes available when the controller mode is selected.

The object is writable and readable.

The data format is DPT 9.001 (16-bit numeric floating-point number, values are presented in 1/100 °C).

---

## 5.9 ACTUAL SETPOINT

---

Allows to read the actual value of the setpoint, taking into account the offset of the current mode. Ref. to p. 2.2 for more details.

It becomes available when the controller mode is selected.

The object is read-only.

The data format is DPT 9.001 (16-bit numeric floating-point number, values are presented in 1/100 °C).

---

## 5.10 COMFORT MODE

---

Allows to switch the device to comfort mode.

It becomes available when the controller mode is selected.

The object is writable and readable.

The data format is DPT 1.001 (1-bit «On/Off» value).

---

## 5.11 STANDBY MODE

---

Allows to switch the device to standby mode.

It becomes available when the controller mode is selected.

The object is writable and readable.

The data format is DPT 1.001 (1-bit «On/Off» value).

---

## 5.12 ECONOMY MODE

---

Allows to switch the device to economy mode.

It becomes available when the controller mode is selected.

The object is writable and readable.

The data format is DPT 1.001 (1-bit «On/Off» value).

---

## 5.13 HVAC MODE

---

Allows to set/read the current operating mode of the device.

It becomes available when the controller mode is selected.

The object is writable and readable.

The data format is DPT 20.102 (8-bit value in the «HVAC» format («Heating, Ventilation and Air Conditioning»): 1 - comfort mode, 2 - standby mode, 3 - economy mode, other values are not used and are ignored during recording).

---

## 5.14 FROST ALARM

---

It is used to alarm on over-cooling.

It becomes available when the value «Send» is selected for 4.21 «Heat / Frost alarms» parameter.

The object is read-only.

The data format is DPT 1.005 (1-bit «Alarm/No alarm» value).

---

## 5.15 HEAT ALARM

---

It is used to alarm on overheating.

It becomes available when the value «Send» is selected for 4.21 «Heat / Frost alarms» parameter.

The object is read-only.

The data format is DPT 1.005 (1-bit «Alarm/No alarm» value).

---

## 5.16 EXTERNAL POWER FAIL

---

It is used to signal the absence/failure of external 24 VDC power to valves.

The object is read-only.

The data format is DPT 1.005 (1-bit «Alarm/No alarm» value).

## 6 DESCRIPTION OF BEHAVIOR OF THE DEVICE AFTER PROGRAMMING

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After the initial loading of the software application the device is in the following state:

- all channels are inactive (parameters 4.1 “Channel activity” of all channels: in the “Inactive” position);
- all settings: default values.

## 7 DESCRIPTION OF BEHAVIOR OF THE DEVICE AFTER LOSS AND RETURN OF BUS VOLTAGE

---

In case of loss of communication with the KNX bus (when the voltage in the bus drops below the permissible level), the device stores in non-volatile memory the settings, current states, and current operating modes of all channels.

After communication with the KNX bus is restored (after the bus voltage returns to the allowable range), each channel switches into a stored state. In the temperature controller mode, each channel switches to the mode set for it by the setting 4.20 “Action on reset”: comfort mode, standby mode, economy mode, or the mode in which the channel was before the loss of communication with the KNX bus.

Before the first control/temperature telegram is received by a channel, that channel is in the “Off/0%” state.