KNX actuator with status LED and 2 inputs

Valve Drive with 2 Inputs 4215/1.2

MTN 6921-0001

www.schneider-electric.com

Contents

1 Functional characteristics

The KNX actuator can be controlled via an integrated thermostat or a continuous room thermostat.
It has 2 inputs for presence sensors and window contact. The input statuses can be transmitted on the bus.

1.1 Benefits

- Infinite valve adjustment through continuous actuating value
- Display of actual valve position via 5 LEDs
- Emergency program on actuating value failure (e.g. for non-operational room thermostat)
- Free choice of compulsory position via object
- Determination of maximum actuating value
- Alarm in the event of actuating value failure
- Valve protection program
- Input for window contact
- Input for presence contact
- Limitation of actuating value
- Precise adjustment at each valve
- Operation with both standard and inverted valves
- Building site function for operation without application
- Large valve stroke enables adjustment to almost all valves
- Simple installation with any valve adapter

1.2 Application options

The KNX actuator is used in combination with a continuous room thermostat.
This involves the actuating value of the room thermostat (RTR) being combined with Object 0.
In order to avoid unnecessary energy loss, the heating output should be reduced in this case, which necessitates the use of window contacts. As the KNX actuator is often positioned near a window, it is possible to use the external interface of the device in this case. In this case, Object 5 is combined with the frost protection or window object of the room thermostat. To create a simple solution, Object 5 can also be combined with Object 1. In this case, the valve moves to a pre-defined position when the window is opened.

A switch for presence reporting can be connected via the second input of the external interface. In this case, Object 6 is combined with the comfort object of the room thermostat.

Object 4 is controlled by a time switch or a switch. The KNX actuator drive switches to summer mode via a 1 on this object, i.e. the valve remains closed.

RTR actuating values are ignored, which prevents overheating, for example in the morning before the setpoint temperature has been reached.

The KNX actuator can monitor the function of the RTR. In this case the KNX actuator regularly expects actuating value telegrams from the RTR. Should these telegrams fail, an alarm telegram can be sent via Object 7. These can be evaluated for maintenance purposes in the central control panel.

If a heating boiler with control for needs-driven forward control, Object 3 (maximum position) of all KNX actuators and the corresponding input of the boiler control are connected to a common group address.

1.3 Special features

- Monitoring actuating value

The KNX actuator can control the function of the room thermostat. To do this, the time delay between 2 actuating value telegrams is monitored and an alarm telegram triggered in the event of failure of actuating value.

- Determination of maximum actuating value (= maximum position)

To adapt the forward flow temperature, the KNX actuator can send an acknowledgement to the heating boiler regarding the current power requirement. This can reduce its temperature if the requirement drops.

- Window and presence contact inputs

The KNX actuator has 2 external inputs, one for a presence contact and one for a window contact. These inputs can be sent on the bus and used to initiate frost protection or comfort mode.

2 Technical data

2.1 General

Power supply:	Bus voltage
Permissible operating temperature:	0°C ...+ 50°C
Runtime:	< 20s / mm
Actuating force:	> 120 N
Max. control stroke:	7.5 mm (linear movement)
Detection of valve limit stops:	Automatic
Linearisation of characteristic valve curve:	Possible via software
Protection class:	III
Protection rating:	EN 60529: IP 21
Dimensions:	HxWxD 82 x 50 x 65 (mm)
Adapter rings suitable for:	Danfoss RA, Heimeier, MNG, Schlösser from 3/93, Honeywell, Braukmann, Dumser (distributor), Reich (distributor), Landis + Gyr, Oventrop, Herb, Onda
Typical power consumption	Motor off: <5 mA Motor on, seal not pressed: 10 mA Motor on, seal pressed: (depending on force) 12..15 mA

3 The application program "Actuator with 2 inputs 4215/1.2"

3.1 Selection in the product database

Manufacturer	Schneider Electric Industries SAS
Product family	7.1 Heating/individual room control
Product type	7.1.1 Actuator
Program name	KNX actuator with status LED and 2 inputs

3.2 Parameter pages

Table 1

Function	Description
Valve characteristics	Standard / user-defined valve settings and transmitting the valve position
Safety and forced mode	Monitoring the actuating value, emergency program, actuating value failure, forced mode, maximum actuating value
External interface	Configure inputs for window and presence contact
User-defined valve characteristics	Inverted valve, fine adjustment of the valve parameters, special characteristic curve, actuating value limitation, response to actuating value changes
Own characteristic valve curve	Prof. parameters for valves with known characteristic curve
Linear characteristic valve curve	Parameters for high-value linear valve

3.3 Communication objects

3.3.1 Object characteristics

Table 2

No.	Function	Object name	Type	Response
0	Approach position	Control variable	1 byte EIS 6	Receive
1	Approach compulsory position	Compulsory position	1 bit EIS 1	Receive
2	Report current valve position	Current valve position	1 byte EIS 6	Send
3	Determine maximum position	Maximum position	1 byte EIS 6	Send and receive
4	Close valve in summer	Summer mode	1 bit EIS 1	Receive
5	Report window status	Widow contact	1 bit EIS 1	Send
6	Report presence status	Presence contact	1 bit EIS 1	Send
7	Report control variable failure	Actuating value loss	1 bit EIS 1	Send

3.3.2 Description of objects

- **Object 0 "Actuating value"**

Receives the actuating value defined by the room thermostat (0…100%)
The valve is positioned accordingly.

- **Object 1 "Compulsory position"**

If a 1 is sent to this object, the valve is moved into the predefined position for forced operation (see Safety and forced mode).
The valve remains in this position until the compulsory mode is cleared again by a 0. The actuating value sent before or during forced mode is started after that. This position is only changed if an actuating value other than the actuating value prior to forced mode is received.
This operating mode takes top priority.

- **Object 2 "Current valve position"**

Sends the actual valve position (0…100%) on the bus.
This function can be enabled (e.g. trouble shooting) or disabled.
This object is not required for normal operation.

- **Object 3 "Maximum position"**

This object has the following functions after configuration:

1. The actuating values of the other actuators (other rooms) receive in order to be able to compare them with the internal actuating values and send them to the heating boiler if they have higher values than the other actuating values.
2. Send the internal actuating values to the other valve actuators, in order to start a new comparison.

- **Object 4 "Summer mode"**

A 1 on this object starts summer mode, i.e. the actuating value is no longer considered and the valve remains closed.
If valve protection is activated, this feature also runs during summer mode (see "Safety and forced operation").
The valve remains in 0% position until the summer mode is cleared again using 0. The actuating value sent before or during summer mode is started after that. This position is only changed if an actuating value other than the actuating value prior to summer mode is received.

- **Object 5 "Window contact"**

Sends the status of the window contact input if it is used (see External interface).

- **Object 6 "Presence contact"**

Sends the status of the presence contact input if selected
(see External interface appendix).

Note:
The window and presence contact objects can be linked to the room thermostat or another of the device's objects via their group address (see below).

- **Object 7 "Actuating value failure"**

Sends an alarm telegram if, within a specific period, no new actuating values are received from the room thermostat.
This object is only available if the "Monitoring the actuating value" parameter has been activated (see parameter page "Safety and forced operation", safety settings: user-defined and in appendix: Monitoring of actuating value).

Example of the window contact:

Object 5 "Window contact" can either be linked with Object 1 "Compulsory position" (KNX actuator) or with the "Frost protection" object of the room thermostat.
Benefit: If a window is opened for venting, the radiator can be turned down (pre-configured valve position) to save heating energy.

Note: If the window input is linked with the compulsory position and a compulsory position from (or approximating) 0% is selected, the radiator may freeze when the window is opened for prolonged periods at low ambient temperatures.

Example of presence contact

Object 6 "Presence contact" can be linked with the "Comfort" object of the room thermometer .
Benefit: The room thermostat can be set to comfort operation via a switch if a room is entered where the heating temperature has been lowered.

3.4 Parameters

3.4.1 Valve characteristics

Table 3

Designation	Values	Application
Valve positions	**Standard** User-defined	For standard valves and applications Prof. setting options
Send if valve position changed	**do not send** With change of 1 % With change of 2 % With change of 3 % With change of 5 % With change of 7 % With change of 10 % With change of 15 %	Is the new valve position to be sent if it has changed from the last sent value? If yes, from which variance? This function is not required in normal operation and is used largely for diagnostic purposes. When the set valve position (actuating value) is reached, it is sent even if the selected change since the last telegram is not reached (except for "do not send")
Cyclical transmission of valve position	**do not send cyclically** Every 2 min. Every 3 min. Every 5 min. Every 10 min. Every 15 min. Every 20 min. Every 30 min. Every 45 min. Every 60 min.	Is the current valve position to be sent in cycles? If so, at what intervals?

3.4.2 Safety and forced mode

Table 4

Designation	Values	Application
Settings for safety	**Standard** User-defined	No safety settings Monitoring the actuating value and valve protection
Monitoring the actuating value*	**Do not monitor** 5 min. 10 min. 15 min. 20 min. 30 min. 45 min. 60 min.	Is the reception of the actuating value to be monitored by the room thermostat (RTR)? Recommended setting: 2x the cycle time of the RTR. See Monitoring of actuating value.
Valve position at actuating value failure*	0% 10% 20% 30% 40% **50%** 60% 70% 80% 90% 100%	Setting the emergency program. In the event of actuating valve failure the valve moves to the set position. The emergency program is ended as soon as a new actuating value is received.
Sends the actuating value failure* object	**Only on actuating value failure** Always following the end of a monitoring cycle	Sent only when the emergency program is active: (Value = 1). Sent at regular intervals: In normal operation with Value 0, in emergency program with Value 1.
Valve position in forced mode	**0%** 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%	Which fixed position is to be approached if the forced object is active? One potential application for this function is ventilation.

Continuation:

Designation	Values	Application
Valve protection*	**Active** Inactive	This function prevents the valve from stopping if it is not actuated for a prolonged period. The valve protection program (if active) is always run if after 24 hrs the control variable has not changed. In this case, the valve is completely opened and then closed. This procedure is not indicated on the LEDs.
Sends "Maximum actuating value" object (for boiler control)	Only if an internal actuating value is greater Every 2 min. Every 3 min. Every 5 min. Every 10 min. Every 15 min. Every 20 min. Every 30 min. Every 45 min. Every 60 min.	For all valve actuators Cyclical transmission time for the individual valve actuator, which the actuating value comparison is to re-initiate This function is required in order to transfer the energy requirement of the entire system to the heating boiler.

* Only visible on **Safety settings: *User-defined***

3.4.3 External interface

Table 5

Designation	Values	Application
Function of ext. interface	none E1: Window contact, E2: None, E1: Window contact, E2: Presence	Which external interfaces are used?
Type of connected window contact	Window open – contact closed, Window open – contact open	Enables both NC and NO contacts to be used
Sends the window status	do not send cyclically Every 2 min. Every 3 min. Every 5 min. Every 10 min. Every 15 min. Every 20 min. Every 30 min. Every 45 min. Every 60 min.	Is the status of the connected window contact to be sent to the bus?
Type of connected presence contact	Present = contact closed, Present = contact open	Enables both NC and NO contacts to be used
Sends the presence status	do not send cyclically Every 2 min. Every 3 min. Every 5 min. Every 10 min. Every 15 min. Every 20 min. Every 30 min. Every 45 min. Every 60 min.	Is the status of the connected presence contact to be sent to the bus?

3.4.4 User-defined valve characteristics

This parameter page only appears if the user-defined valve settings are selected on the "Valve characteristics" page

Table 6

Designation	Values	Application
Effect of the valve	Normal, closed when depressed Inverted, open when depressed	For all standard valves Adjustment to inverted valves
Strategy for identifying valve	**Standard** Automatic With defined valve stroke	Standard identification for most valve models. The valve is closed with a pre-defined force (see below, "Closing force for" parameter). The 0 % position is checked at the valve with every run and the “100 % open” position is measured at the valve. The 0 % position is checked at the valve with every run and the 100 % (open) position is established from the set stroke.

Continuation:

Designation	Values	Application
Strategy = Standard		
Additional pressing of rubber seal in 1/100mm	0..79 (Default = **20**)	The set value determines the additional pressing in 1/100 mm. This allows the valve to be further closed by a set path if, due to the characteristics of the rubber seal, it fails to close completely. **Caution:** In order to avoid seal damage, the value should be increased by max. 10 increments. Setting: 1 is equivalent to 1/100mm 10 is equivalent to 0.1 mm 20 is equivalent to 0.2 mm etc. See accessories: Valves and valve seals
Strategy = Automatic		
Closing force for	**Standard valves** Valves with high spring tension	This parameter determines the closing force for the 0 % position
Strategy = With defined valve stroke		
Closing force for	**Standard valves** Valves with high spring tension	See above.
Valve stroke	2 mm, **3 mm**, 4 mm, 5 mm, 6 mm	The traverse from the 0% to the 100 % position are set manually.

Continuation

Designation	Values	Application
Type of valve seal	Standard valve seal Valve with hard seal Valve with soft seal Valve with medium-soft seal	This parameter should be changed only if the valve does not open with low control variables. (see Troubleshooting)
Characteristic valve curve	Typical characteristic curve Own characteristic curve Linear characteristic curve	For all standard valve types For special valves with known characteristic curves For high-value valves
Minimum actuating value	0% 5% 10% 15% 20% 25% 30% 40%	Lowest valve position available This parameter prevents the valve whistling if the flow rate is too low.
Response if the minimum actuating value is underrun	0% 0 % = 0 % otherwise min. actuating value	With every actuating value below the Minimum value, the KNX actuator should be set to 0 %. With every actuating value below the minimum value, the KNX actuator runs to the position of the previously set minimum actuating value. The valve does not close fully until a actuating value of 0% is reached.
Maximum actuating value	60% 70% 75% 80% 85% 90% 95% 100%	Highest valve position available. Hint: Because most valves do not change their flow between 60% and 100%, the positioning frequency can be reduced by indicating a maximum actuating value of 60%.

Continuation

Designation	Values	Application
Approaching new valve position	Position always accurate On change of control variable >1 % On change of control variable >2 % On change of control variable >3 % On change of control variable >5 % On change of control variable >7 % On change of control variable >10 % On change of control variable >15 %	The valve is re-positioned each time the control variable is changed. The valve is never repositioned until the control variable has changed from the last position by more than the set value. Enables frequent, small positioning increments to be suppressed **Important:** Too high a value can affect the temperature control.

3.4.5 Own characteristic valve curve

Prof. setting for special valves.

This parameter only appears if an internal characteristic valve curve has been selected from the "Device settings" page.
The actuator response can be accurately adjusted using the characteristic valve curve (manufacturer's documentation).
This parameter enables the KNX drive to be adjusted on a valve at 9 points of the characteristic curve (10%...90%). A certain flow is reached for each point at a certain % of the valve stroke.

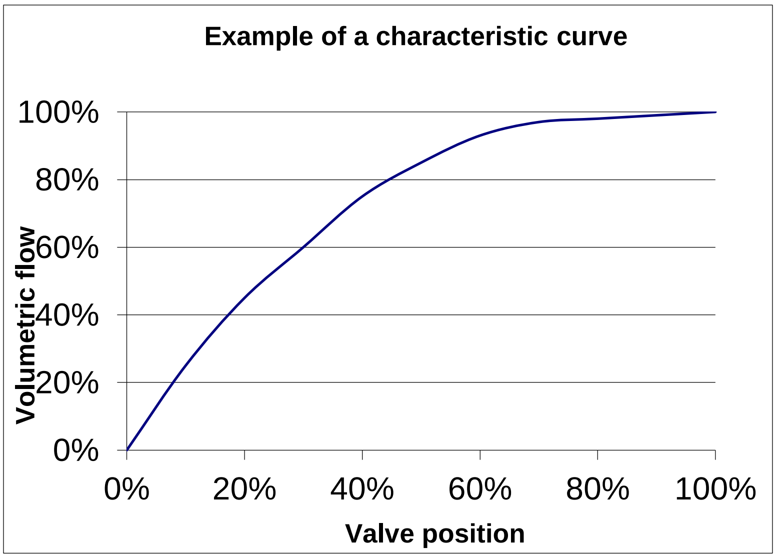
Table 7

Designation	Values	Application
Valve stroke in % for 10% volumetric flow (1..99)	1..99 (**10**)	At what % valve stroke is a volumetric flow of 10% reached?
Valve stroke in % for 20 % volumetric flow (1..99)	1..99 (**20**)	At what % valve stroke is a volumetric flow of 20% reached?
Valve stroke in % for 30 % volumetric flow (1..99)	1..99 (**30**)	At what % valve stroke is a volumetric flow of 30% reached?
Valve stroke in % for 40 % volumetric flow (1..99)	1..99 (**40**)	At what % valve stroke is a volumetric flow of 40% reached?
Valve stroke in % for 50 % volumetric flow (1..99)	1..99 (**50**)	At what % valve stroke is a volumetric flow of 50% reached?
Valve stroke in % for 60 % volumetric flow (1..99)	1..99 (**60**)	At what % valve stroke is a volumetric flow of 60% reached?
Valve stroke in % for 70 % volumetric flow (1..99)	1..99 (**70**)	At what % valve stroke is a volumetric flow of 70% reached?
Valve stroke in % for 80 % volumetric flow (1..99)	1..99 (**80**)	At what % valve stroke is a volumetric flow of 80% reached?
Valve stroke in % for 90 % volumetric flow (1..99)	1..99 (**90**)	At what % valve stroke is a volumetric flow of 90% reached?

The values in brackets indicate a linear valve.

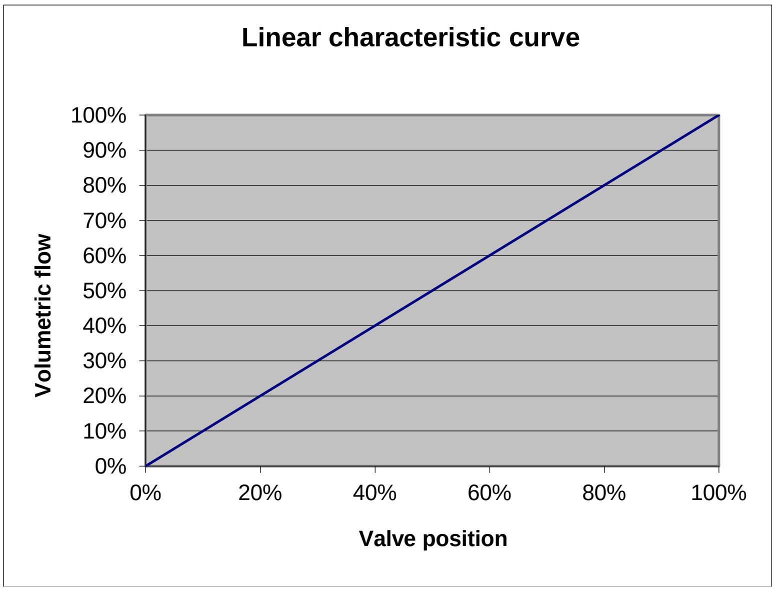
Diagram 1 shows a characteristic valve curve, as occurs frequently in practice.
In this characteristic curve, a 30% flow occurs at a valve stroke as low as 10%. At a valve stroke of 50%, the flow is over 80%.

Diagram 1



A linear characteristic curve as shown in Diagram 2 would be ideal for the control.
A non-linear characteristic curve can be linearised by inputting an own characteristic curve.
To do this, the valve position (stroke) at 10, 20.....90% is taken from Diagram 1 and "internal characteristic curve" entered into the parameter page.

Diagram 2



3.4.6 Linear characteristic valve curve

This setting should be used only for valves described exclusively as linear.
Note: The values can be shown but not changed in this table.

Table 8

Designation	Values	Application
Valve stroke in % for 10% volumetric flow (1..99)	**10**	At 10% valve stroke, a volumetric flow of 10% is reached, at 20%, a volumetric flow of 20% is reached etc.
Valve stroke in % for 20 % volumetric flow (1..99)	**20**	
Valve stroke in % for 30 % volumetric flow (1..99)	**30**	
Valve stroke in % for 40 % volumetric flow (1..99)	**40**	
Valve stroke in % for 50 % volumetric flow (1..99)	**50**	
Valve stroke in % for 60 % volumetric flow (1..99)	**60**	
Valve stroke in % for 70 % volumetric flow (1..99)	**70**	
Valve stroke in % for 80 % volumetric flow (1..99)	**80**	
Valve stroke in % for 90 % volumetric flow (1..99)	**90**	

4 Start-up

IMPORTANT INFORMATION:

- If maintenance work is carried out on the radiator, the actuator should always be removed and the valve securely closed by an alternative method (original protective cap etc..). The valve could be unexpectedly opened, potentially causing water damage, through either the control or the valve protector.
- The device must be mounted on the valve when the application is downloaded to enable adjustment.

4.1 Installation and automatic adjustment (calibration run)

First, the device is mounted on the valve using the correct adapter ring.
The bus voltage can then be applied.
This automatically starts the adjustment process (calibration run).

When does the adjustment process occur?
Automatic adjustment occurs for the first time after the bus voltage is applied in the Site function and afterwards each time the application is downloaded.

A new calibration run is performed at regular intervals after reset and during the course of the heating phase.

In order to correct the changes of the Valve characteristics over the course of time (aging of the rubber seal), the valve is automatically remeasured on a regular basis.

NOTE:

- **If an adjusted device is mounted on a different valve, the adjustment process must be repeated by downloading the application.**
- **The previously stored positions are deleted after a download.**
  The calibration run is performed twice on account of the plausibility test.

4.2 Calibration strategies

Three different calibration strategies are available.
The aim is to enable adjustment to maximum number of different valves.
The selection of the calibration strategy is made via input in the "Strategy for valve identification" parameter

4.2.1 Strategy 1, standard

The valve is measured during a calibration run (e.g. after reset) and the "valve open" and "valve closed" positions are stored. The calibration run is performed twice after download and the resulting values compared for plausibility. The calibration run is performed until two successive matching value pairs have been measured. These values are then stored and the positions used for future runs. The measured values are compared with the stored values during the calibration run so that the process is only performed once for plausibility.

4.2.2 Strategy 2, Automatic

With this option, only the "Open" valve position is calculated during the calibration run. In order to close the valve, the actuator pushes out the tappet until the set force is exerted on the valve. The following closing forces are available:

Closing force for	Closing force
Standard valves	approx. 100 N
Valves with high spring tension	approx. 120 N

It is always recommended to use the "normal valve" setting first as this is completely sufficient for most valves.
The "Valve with high spring tension" setting should only be tried if you cannot close the valve. This enables the current consumption to be increased to 15 mA during the pressing of the rubber seal.

4.2.3 Strategy 3, with defined valve stroke.

With this option, only the Open position of the valve is calculated by working back from a set path from the closing position. In order to close the valve, the actuator pushes out the tappet until the set force is exerted on the valve (closing force for standard valves/valves with high spring tension).
This calibration strategy is primarily to be used if the actuator tappet touches the valve tappet, even if it is completely withdrawn, and measurements cannot be performed.
With a completely unknown valve, the **3 mm** with closing force for standard valves value is a usable starting value.
It is always recommended to use the closing force for standard valves first.
This setting is completely suitable for most valves.
The Valve with high spring tension setting should only be tried if you cannot close the valve. This enables the current consumption to be increased to 15 mA during the pressing of the rubber seal.
The sequence light comes on if this calibration method fails three times.

4.2.4 LED display during calibration run

Old/new

LEDs	Response
4 3 2 1 0 (lit red)	Flashes as long as the spindle is in its maximum inner position
4 3 2 1 (lit red) 0	Flashes while valve is scanned
4 3 2 (lit red) 1 0	Flashes during position calculation (can be very brief)

4.3 Site function

While the device remains in the delivered condition, i.e. no further applications have been downloaded, the KNX actuator functions in site mode.

This causes the valve to open to 25% to prevent the radiator from freezing.

This function enables the KNX actuator to be used on site **immediately with limited functions**.

The site function is finally deleted once the application software has been downloaded.
From this point, and provided no actuating value is received, the KNX actuator completely closes the valve after reset.

4.4 Verification of 0 % position.

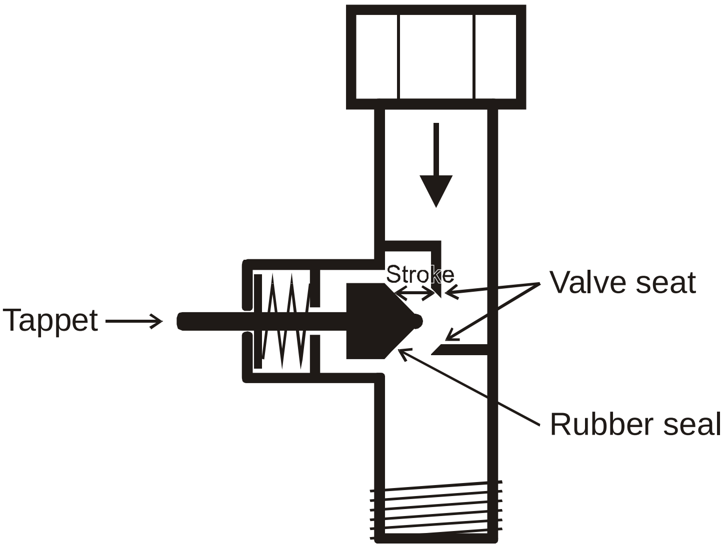
After set-up and completed adjustment it is recommended to check whether a radiator valve closes correctly.
It is essential to wait for the radiator to completely cool down (after heating up during calibration run).
This can take a long time depending on the feed temperature.

Please ensure that no actuating values > 0% are sent to the device during this phase.
In addition, forced mode can be activated with 0 % or summer mode as a precaution.

5 Appendix

5.1 Valves and valve seals

5.1.1 Valve structure



5.1.2 Valves and valve seals

When idle, i.e. tappet not actuated, the tappet is pushed outwards by the spring and the valve opens (100% with normal effect).
When the tappet is pushed, the rubber seal is pressed into the valve seat and the valve closes (0% position with normal effect).

The valve does not close immediately on touching the valve seat, depending on the characteristics, the existing tappet may have to move onwards until the valve is fully closed.
This response depends on the hardness, shape, aging or damage to the valve seal.

An additional pressing of the valve seal can be entered to correct the influence of this configuration (see Troubleshooting).

Caution: In order to avoid seal damage, the value should be increased by max. 10 increments.

5.2 Limitation of actuating value

The KNX actuator receives an actuating value (0..100%) from the room thermostat or from an actuator with an integrated thermostat. It is not usually necessary to use the entire bandwidth between 0% and 100%).

5.2.1 Maximum actuating value

In the upper ranges of many valves, the flow ceases to vary at actuating values of between 60% and 100%, i.e. the radiator has already heat to a actuating value of 60% at its maximum output.
Consequently, valve actuator readjustment in the upper range can be suppressed without detriment, thereby significantly reducing the positioning frequency.

5.2.2 Minimum actuating value

The unpleasant whistling noise that some valves can generate at low actuating value can be avoided by specifying a minimum actuating value (see User-defined valve characteristics).
If, for instance, this response is determined at below 8%, a minimum actuating value of 10% is specified.
On receipt of an actuating value below the specified limit value, the KNX drive can respond in one of two ways ("Response on underrunning the minimum actuating value"):

- Either move immediately to 0% ("0%")
- or stop at the position of the minimum actuating value and on receiving the actuating value 0%, closing the valve completely (0%=0% otherwise minimum actuating value)

5.3 Determines the maximum control variable

5.3.1 Application

If within a system all valve actuators are only slightly open, e.g. one at 5%, one at 12%, another at 7% etc., the heating boiler can reduce its output because only a small amount of heating energy is required.
In order to guarantee this, the heating boiler requires the following information:
How high is the actuating value in the room, which currently exhibits the greatest heat requirement?

With valve actuators, this particular task is handled by the "Detect maximum position" function.

5.3.2 Principle

The actuating values are constantly compared between all participants (KNX actuators). Those participants with a higher actuating value than the one received may send it, those with a smaller one may not.
In order to accelerate this process, the greater the difference between its own and the received actuating value, the greater the speed at which the actuator sends. Thus, the actuator with the highest actuating value sends first and beats the remainder.

5.3.3 Practice

The actuating value comparison takes place via Object 3 ("Maximum position").
In addition, a common group address for the maximum position for each valve actuator is set on Object 3.

In order to start the actuating value comparison between the participants, one (and only one) participant must send a value to this group address in cycles.
This task can be handled by either boiler or valve actuator.
If it is the boiler, it must send the smallest possible value, i.e. 0%.
If it is one of the actuators, the "Send object" maximum actuating value configuration must be sent on the "Safety and forced mode parameter page
(for boiler control) to any cycle time. This actuator then regularly sends its own actuating value and the others can respond accordingly.

Irrespective of which participants act as initiator, the "Send maximum actuating value (for boiler control)" parameter must be set to the default value of "Only is an actuating value is greater".

5.4 Monitoring actuating value

5.4.1 Application

Should the room thermostat (RTR) fail, despite the last sent actuating value being 0%, all valves remain closed, irrespective of the continued temperature characteristic curve. This can result in considerable damage, if for example, cold air enters the room when the ambient temperature is below zero.

To avoid this situation, the KNX actuator is able to guarantee the following functions:

- monitor the correct function of the room thermostat
- start an emergency program on actuating value failure
- transmit the status obtained from actuating value monitoring

5.4.2 Principle

The KNX actuator monitors whether, within the configured period of time, at least 1 actuating value telegram is received and assumes a predefined position should the actuating value fail.

5.4.3 Practice

The RTR is configured for cyclical transmission of the actuating value.

The monitoring time on a KNX actuator is set to a value that is at least twice as long as the cycle time of the RTR.
If the RTR transmits an actuating value every 10 minutes, the monitoring time must be
at least 20 minutes.

After an actuating value loss, normal operation is resumed as soon as a new actuating
value is received.

5.5 External interface

The external interface consists of inputs E1 and E2.
Both inputs are routed through the device connection line.

The inputs are configured on the "External interface“ parameter page.

Depending on the configuration, the current status of the two inputs is sent on the bus and can therefore be evaluated by other participants (actuator with integrated thermostat, room thermostat etc.)

DANGER
Risk of fatal injury from electrical current.
Equipment may be destroyed!
Applied voltages at the extension inputs E1 and E2 lead to voltage carryovers on the bus.

- Never connect voltage to the extension inputs E1 and E2.
- Never connect the extension inputs E1 and E2 to the extension inputs of other device.
- Connect only floating contacts to the extension inputs E1 and E2

To guarantee the proper functioning of the device, the maximum cable length of 5 m between the extension inputs E1 and E2 and the floating contact must not be exceeded.

5.5.1 Connections

Table 9

Name	Colour	Function
BUS	Black (-)	EIB bus line
	Red (+)	
E1	Yellow	Binary input for window contact(s)
	Green	
E2	White	Binary input for presence detector or presence key
	Brown	

5.5.2 Input E1

E1 is used for window contacts (if present).
The window contacts can be connected directly and without additional supply voltage.

5.5.3 Input E2

A presence detector or push button can be directly connected

6 Troubleshooting

Table 10

Response	Potential cause	Remedy
Valve does not close when actuating value is 0%	Valve seal is insufficient for pressing onto the valve seat	Enter additional pressing of rubber seal. **Caution:** Increase parameter by max. increments of 10. OR Select a different Calibration strategy .
	Valve seal is damaged	Replace valve.
Valve opens only with an unexpectedly large actuating value	Existing valve seal is too soft	Adapt parameter type of valve seal. Valve opens only with actuating values over: 5% ⇒Standard valve seal 10% ⇒ medium-soft seal 20% ⇒ select soft seal
Valve moves actuating value below or above a certain valve	Minimum or maximum actuating value parameter(s) have been changed	Check minimum and maximum actuating value parameters
No display or no calibration run after reset	The KNX actuator is discharged using ETS software	Reprogram device: Physical address + application
Error message with ETS request/device info: Implementation status → is not working	The KNX actuator is discharged using ETS software	Reprogram device: Physical address + application

6.1 Checking end position

The end positions stored during the adaption process can be read out in exactly the same way as the error numbers using the ETS software.

The internal limit stop position (spindle inserted, valve open) is stored in Hex-format under the address $1FC and the external limit stop position under $1FD.

After downloading the application, these values are reset (i.e. $1FC = 00 and $1FD = FF).
The found limit stop positions are entered here following successful adaption.
If both addresses show 00 after adaption, the adaption is deemed to have been unsuccessful.

To determine the limit stop positions in millimetres, the values are converted into decimal and divided by 20.

Example calculation:

Table 11

Position	Valve	Address	Hexadecimal Value	Equivalent to decimal value	Result decimal value/20 =
Internal limit stop	open	$1FC	24	36	1.8 mm
External limit stop	Closed	$1FD	61	97	4.85 mm

The stroke is calculated from the two values as follows:

Stroke = external limit stop - internal limit stop

In our example:
Stroke = 4.85 – 1.8 mm = 3.05 mm

Limit values for successful adaption

The following values must be respected:

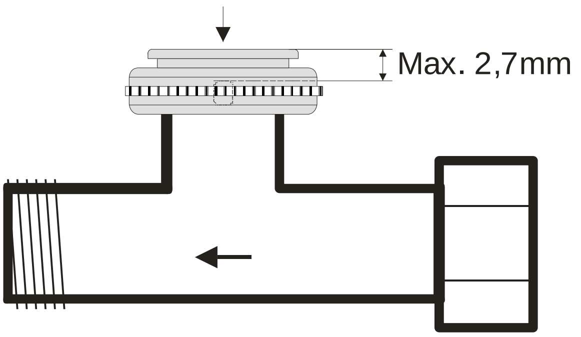
Table 12

Internal limit stop		External limit stop		Stroke	
Dimension	Hex value	Dimension	Hex value	Dimension	Hex value
≥ 0.3mm	≥ 6	≤ 7.5mm	≤ 96	≥ 1.2mm	≥ 18

6.2 Checking adapter ring

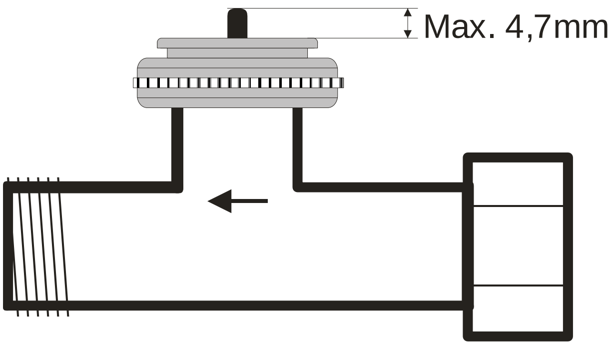
6.2.1 Depressed status

The space between the top edge of the adapter and the top edge of the depressed tappet must not exceed 2.7 mm.

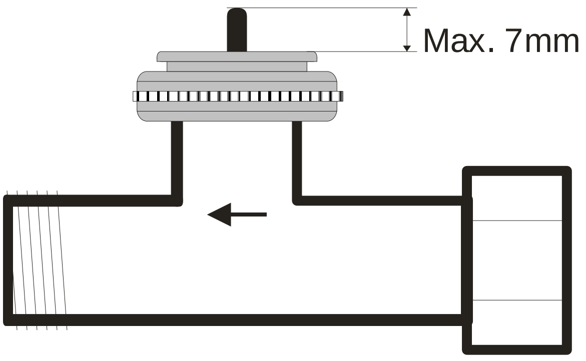


6.2.2 Unpressed status

All calibration strategies can be used up to a maximum dimension of 4.7 mm.



A dimension of up to 7 mm can be used with the third calibration strategy.
Caution: The valve cannot completely open with a dimension > 4.7 mm.
This is irrelevant in most cases as the flow of many valves is sufficient if they are half open.
A stroke of up to a maximum of 4.7 mm can be used, so the remaining stroke and characteristic valve curve must 4,7 mm must be estimated to determine whether the valve adapter is suitable.



6.3 Reading software version number

The KNX actuator displays the current software version via LEDs.

After reset, this is displayed as a binary number in three stages.

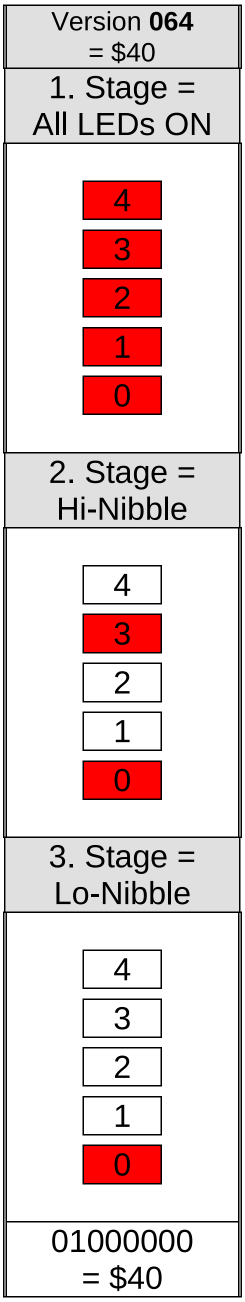
- Stage 1: Full display: All LEDs = ON
- Stage 2: LED 0 is ON and the upper 4 Bits are shown
  (= Hi-Nibble, significance: see table)
- Stage 3: LED 0 is ON and the lower 4 Bits are displayed (= Lo-Nibble).

The values of the individual LEDs is displayed as follows:

LED	Value
4	8 (=2^3)
3	4 (=2^2)
2	2 (=2^1)
1	1 (=2^0)
0	none

The number is produced from the sum of the values of the illuminated LEDs 1..4.
LED 0 is not counted.

6.3.1 Example: Version 064



7 Glossary

7.1 Valve stroke

Mechanical path between the two end positions, i.e. 0% (valve closed) and 100% (valve fully open), which is covered (see Valve arrangement diagram).

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