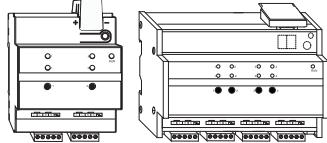


KNX universal dimming actuator LL REG-K

Operating instructions



**KNX universal dimming actuator LL
REG-K/2x230/300 W**
Art. no. MTN6710-0002

**KNX universal dimming actuator LL
REG-K/4x230/250 W**
Art. no. MTN6710-0004

For your safety



DANGER

Risk of serious damage to property and personal injury, e.g. from fire or electric shock, due to incorrect electrical installation.

Safe electrical installation can only be ensured if the person in question can prove basic knowledge in the following areas:

- Connecting to installation networks
- Connecting several electrical devices
- Laying electric cables
- Connecting and establishing KNX networks

These skills and experience are normally only possessed by skilled professionals who are trained in the field of electrical installation technology. If these minimum requirements are not met or are disregarded in any way, you will be solely liable for any damage to property or personal injury.

Getting to know the actuator

Overview of functions

The KNX universal dimming actuator LL (referred to as actuator in the following) can dim and operate various loads for each channel.

The actuator automatically detects the connected loads for each channel.

The actuator is also adjusted for the special requirements of LED and ESL/CFL lamps.

LED = light-emitting diode

ESL = energy saving lamp, also known as **CFL** = compact fluorescent lamp.

When the electrical power returns, the respective channel remains switched off. However, the ETS also has a setting for restoring the last brightness level.

You can connect the channels of the actuator to different outer conductors.

You can use the channel keys to operate the actuator manually.

In the ETS you can activate additional time, logic, scene and central functions (see separate application description).

Loads per channel

- 230 V incandescent and halogen lamps (ohmic load).
- Low-voltage halogen lamps with dimmable, wound transformers (inductive load).
- Low-voltage halogen lamps with dimmable, electronic transformers (capacitive load).
- A combination of ohmic and inductive loads: 230 V halogen and incandescent lamps, halogen lamps with wound transformers.
- A combination of ohmic and capacitive loads: 230 V halogen and incandescent lamps, halogen lamps with electronic transformer, LED or ESL/CFL.
- Dimmable ESL/CFL.
- Dimmable LED lamps.

i Each dimming channel requires a minimum load for operation (see "Technical data" section). If this is not reached, malfunctions may arise.

The following dimming operating modes can be selected:

- RC operating mode = trailing edge phase (automatic).
- RL operating mode = leading edge phase (automatic).
- RL-LED operating mode = leading edge phase LED, ESL/CFL (can be set on ETS).

i The loads are detected automatically for each channel. Normally, LED or energy saving lamps are automatically preset to the operating mode **trailing edge phase**. Alternatively, you can also set the "**leading edge phase LED, ESL/CFL (RL-LED)**" dimming operating mode on the ETS. You should select this mode in the following cases:

- The manufacturer of the light expressly recommends the leading edge phase (RL) operating mode.
- The lowest dimming value in trailing edge phase (RC) operating mode is still too bright and the manufacturer of the light does not permit leading edge phase operating mode.

LED, ESL/CFL

- Do not use LED and ESL/CFL lamps together; only use lamps from the same manufacturer and try to make sure they are all the same model as far as possible in order to achieve satisfactory dimming properties.
- The maximum power of each channel is generally lower for LED and ESL/CFL lamps than for other loads.
- In the operating mode "leading edge phase LED, ESL/CFL (RL-LED)" the values are also significantly lower. The maximum power depends heavily on the LED and energy saving lamps used. If the load is too high, the actuator dims to minimum brightness or switches off directly. In this case, reduce the number of luminaires.
- For more detailed information refer to the dimmer tool and the section "Technical data".

Dimmer tool

Schneider Electric has tested numerous dimmable LED and energy saving lamps. The dimmer tool provides information on dimmable lamps and the minimum and maximum number of individual lamp models.

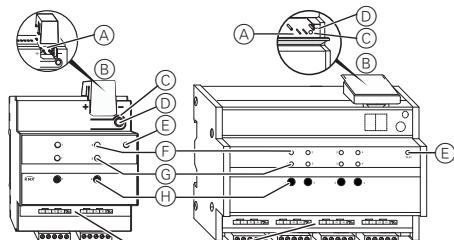
<http://schneider-electric.dimmer-test.com>

CAUTION

The device can become damaged.

- Only operate the device according to the specifications listed in the technical data.
- Only connect dimmable transformers to the dimmer when you use transformers.
- Only use wound transformers with a load of at least 30% of the nominal load.
- Do not connect a combination of capacitive and inductive loads to one channel.
- Do not connect a combination of LED or ESL/CFL lamps and inductive loads such as wound transformers to one channel.
- Do not use dimmers on socket-outlets. The risk of overload and connecting unsuitable devices is too high.

Connections, displays and operating elements



- (A) Bus connection
- (B) Cable cover
- (C) Programming button
- (D) Programming LED (red)
- (E) Operational LED "RUN" (green)
- (F) Channel status LED (yellow) for the corresponding channel
- (G) Channel error LED (red) for the corresponding channel
- (H) Channel keys for manually controlling the channel in question
- (I) Channel terminals for supply voltage and loads

	Operational LED (green)	Channel status LED (yellow)	Channel error LED (red)
Normal operation			
Channel switched off	on	off	off
Channel switched on	on	on	off
Exception mode			
No bus voltage or application not loaded			
Channel switched off	off	off	off
Channel switched on	off	on	off
Stop to operation			
No mains voltage at a configured channel	Flashing	off	off
No mains voltage at a configured channel and no bus voltage	off	off	off
Overload, channel is dimmed to minimum	on	on	on
Short circuit or overload, channel switched off	on	off	on

Mounting the actuator



DANGER

Risk of death from electric shock.

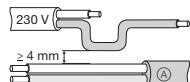
The outputs may carry an electrical current even when the device is switched off. Always disconnect the fuse in the incoming circuit from the supply before working on connected loads.



WARNING

Risk of death from electric shock. The device can be damaged.

Safety clearance must be guaranteed in accordance with IEC 60664-1. There must be at least 4 mm between the individual cores of the 230 V supply cable and the SELV line \textcircled{A} .



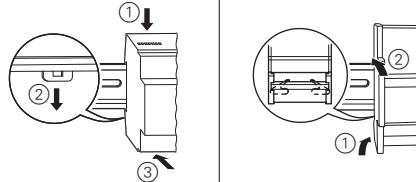
CAUTION

The device can become damaged.

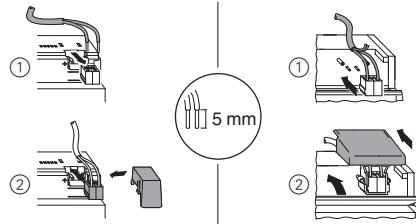
- Ensure that basic insulation is fitted. All devices that are mounted next to the actuator must at least be equipped with basic insulation.
- Ensure that bridges are fitted on the connecting terminals. The two L and N connections per channel are each bridged internally. When several channels are linked up via these connections you also need to insert bridges in the connecting terminals. If no bridges are used other channels may become damaged when removing the terminals of one specific channel due to voltage displacement.
- Do not electrically connect a load in parallel to several channels. For the maximum permitted loads for channels that are not used, see the "Technical data" section.

The installation site must provide sufficient cooling and unimpeded air circulation through the cooling slots of the device.

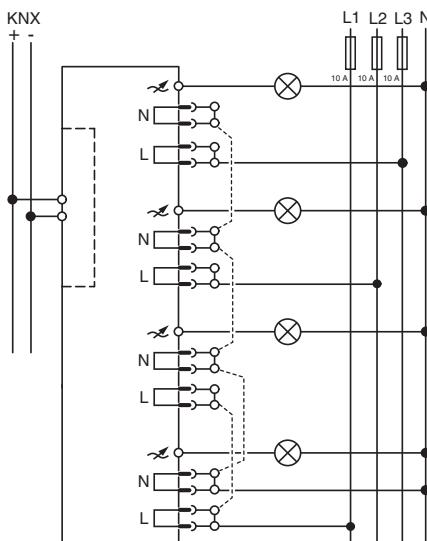
Position the actuator on the DIN rail



Connecting KNX



Connect the load



Circuit diagram for 4-gang actuator (example)

i The circuit diagram also applies for the 2-gang actuator.

Connecting the voltage

Connect the load and bus voltage.

Putting the actuator into operation

- Press the programming button. The programming LED lights up.
- Load the physical address and application into the device from the ETS. The programming LED goes out.

The operational LED lights up: the application has been loaded successfully and the device is operative.

Load detection

Load detection determines whether an inductive, capacitive or ohmic load is connected.

Load detection is only possible if the voltage and frequency are in the permissible range and there is no short circuit or overload.

When the mains voltage returns load detection is performed either when switching on or dimming for the first time (value > 0). In order for this to occur, the light is dimmed to minimum brightness and then the value desired by the user is set. The load is also monitored with respect to inductive properties during continuous operation.

The following dimming operating modes can be selected:

- RC operating mode = trailing edge phase (automatic)
- RL operating mode = leading edge phase (automatic)
- RL-LED operating mode = leading edge phase LED, ESL/CFL (RL-LED) (can be set on ETS)

Normally, trailing edge phase is set automatically for LED or ESL/CFL lamps. Alternatively, you can also set the dimming operating mode "leading edge phase LED, ESL/CFL (RL-LED)" on the ETS. The operating mode is only suitable for LED or ESL/CFL lamps. The setting is activated once the application has been downloaded. In this case too, the load is also monitored with respect to inductive properties and if necessary the operating mode is switched to RL.

Operating the actuator

Operate the dimmer via one of the following:

- KNX
- Channel buttons on the actuator

Switching/dimming luminaires

If bus voltage is available, operation via the channel keys depends on the parameters of the application (see the separate application description). When channel operation is enabled you can use the keys to do the following:

- Switching on and off: Press the key briefly
- Dimming brighter/darker: Hold the key down for a while

As long as the key is held down, the lamp will get brighter or darker. The dimming direction is only changed after the key has been held down twice.

If there is no bus voltage (operational LED off), you can use the channel keys to do the following:

- Switching on and off: Press the key briefly
- Dimming brighter/darker: Hold the key down for a while

As long as the key is held down, the lamp will get steadily brighter and darker. Once the maximum or minimum has been reached, the dimming direction is reversed.

What should I do if there is a problem?

Overload

The brightness of the connected lamps is automatically dimmed down and cannot be changed.

Operational LED (green)	Channel status LED (yellow)	Channel error LED (red)
on or off	on	on

An error message is sent via KNX if it has been parameterised.

The actuator has detected an overload.

i The temperature is also considered when monitoring the load. The temperature of the actuator goes up in relation to the size of the connected load. It also goes up if there is insufficient heat dissipation from the actuator. When several dimming actuators are installed next to one another, they might cause each other to heat up. Have a skilled electrician rectify the causes of the overload and rise in temperature (see section "For your safety"). The change in maximum load values in relation to the ambient temperature can be seen in section "Technical data".

You can acknowledge the fault with the channel key. Then the channel can be operated normally again. If an overload is detected for a second time then the channel is switched off and shows the same behaviour as in the case of a short circuit.

Short circuit and overload

The connected load switches off automatically and can no longer be operated or dimmed.

Operational LED (green)	Channel status LED (yellow)	Channel error LED (red)
on or off	off	on

An error message is sent via KNX if it has been parameterised.

The cause of this is either a short circuit or another overload.

For this to be fixed the mains voltage of the channel affected must be switched off.

Have a skilled electrician rectify the cause (see section "For your safety").

Once the cause has been removed you can use the actuator normally again. When the mains voltage returns load recognition is performed when the light is turned on or dimmed for the first time (value > 0) (see section "Commissioning actuator").

If an overload occurs again then the dimmer is dimmed down to minimum brightness (see overload).

Faults in LED, ESL/CFL lamps

If one of the following faults occur, the dimming operating mode may be wrong.

- The dimming range is very low. The lights cannot be dimmed down enough.
- Faults occur in the light during the dimming process. Faults such as flickering can occur in the whole dimming range.

In both cases, check whether you have connected dimmable LED or ESL/CFL lamps.

You can set the dimming operating mode "leading edge phase LED, ESL/CFL (RL-LED)" in the ETS. Make sure that the leading edge phase (RL) operating mode is not prohibited by the manufacturer. In the RL-LED operating mode the dimming properties are normally better but the maximum power is considerably lower (see section "Technical data").

The following faults can occur at low brightness.

- When you dim down to minimum brightness no light can longer be detected.
- Faults such as flickering of the light at low brightness.

Increase the minimum dimming value in the ETS in order to avoid the fault.

- At high brightness levels no changes to the brightness can be perceived.

Reduce the maximum dimming value in the ETS in order to make the dimming process clearer and smoother.

Minimum nominal voltage for ESL/CFL

Compact fluorescent lamps cannot be switched on at minimum brightness.

These lamps often need a minimum voltage for the ignition process.

Select the parameter "Always start at 50% brightness (ESL/CFL)" in the ETS.



Flickering of the light due to surrounding ripple control signals

These faults originate from ripple control transmitters that can use signals to operate street lamps. The signals occur briefly and are similar to Morse messages with various brightness levels. The extent of the possible fault also depends on the specific light in question.

Mains voltage failure

The connected loads of one or several channels switch off automatically and can no longer be operated or dimmed.

Operational LED (green)	Channel status LED (yellow)	Channel error LED (red)
off or flashing	off	off

The mains voltage has failed at the relevant channels.

If the bus voltage is still active, the green operational LED will flash.

When the mains voltage is turned back on the channels remain switched off if the presetting has been kept in the ETS. Different properties can occur for other ETS settings. For example, the last brightness level can be restored.

Bus voltage failure

The loads can now only be operated or dimmed using the channel keys. Control via KNX is not possible.

Operational LED (green)	Channel status LED (yellow)	Channel error LED (red)
off	on or off	off

The bus voltage has failed.

This status is called exception mode.

Exception mode is also active when no application has been transferred to the dimming actuator.

When the bus voltage returns the channels remain in the same state as before the failure if the presetting has been kept in the ETS. Different behaviour can occur with other ETS settings. For example, the last brightness level can be restored.

Technical data

Power supply from KNX:	DC 24 V, approx. 10 mA
Insulation voltage:	AC 4 kV bus/mains voltage
Nominal voltage:	AC 220/230 V, 50/60 Hz
Fuse:	The actuator must be fused using a 10 A circuit breaker.

Minimum nominal power

ohmic loads (230 V incandescent and halogen lamps):	> 4 W
inductive loads (low-voltage halogen lamps with wound transformers):	> 25 VA
capacitive loads (low-voltage halogen lamps with electronic transformers):	> 4 VA
dimmable LED or ESL/CFL in the trailing edge phase operating mode = RC:	> 4 VA
dimmable LED or ESL/CFL in the leading edge phase operating mode LED ,ESL/CFL (RL-LED):	> 4 VA

Maximum nominal power

ohmic loads, ohmic-inductive or ohmic-capacitive loads:

MTN6710-0002:

Assignment	Chann. 1 W/VA	Chann. 2 W/VA
2 channels	300	300
1 channel	400	-
	-	400

MTN6710-0004:

Assignment	Chann. 1 W/VA	Chann. 2 W/VA	Chann. 3 W/VA	Chann. 4 W/VA
4 channels	250	250	250	250
3 channels	250	250	-	350
2 channels	350	-	-	350
1 channel	350	-	-	-

LED or ESL/CFL in the operating mode "trailing edge phase = RC"

MTN6710-0002:

Assignment	Chann. 1 W/VA	Chann. 2 W/VA
2 channels	180	180
1 channel	240	-

MTN6710-0004:

Assignment	Chann. 1 W/VA	Chann. 2 W/VA	Chann. 3 W/VA	Chann. 4 W/VA
4 channels	125	125	125	125
3 channels	125	125	-	200
2 channels	200	-	-	200
1 channel	200	-	-	-

LED or ESL/CLF in operating mode "leading edge phase LED, ESL/CFL (RL-LED)":

MTN6710-0002:

Assignment	Chann. 1 W/VA	Chann. 2 W/VA
2 channels	30 - 50*	30 - 50*
1 channel	40-100*	-

* The lower value is a maximum value that can normally be reliably achieved by most lamps. Many lamps achieve much better values. The upper value was measured with the "Philips Master LEDspot MV VLE D 5.3-50W GU10 827 36D" lamp.

MTN6710-0004:

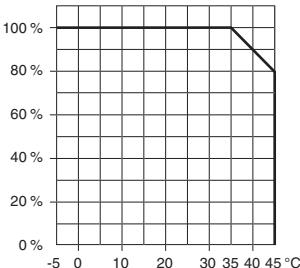
Assignment	Chann. 1 W/VA	Chann. 2 W/VA	Chann. 3 W/VA	Chann. 4 W/VA
4 channels	25 - 45*	25 - 45*	25 - 45*	25 - 45*
3 channels	25 - 45*	25 - 45*	-	40 - 90*
2 channels	40 - 90*	-	-	40 - 90*
1 channel	40 - 90*	-	-	-

* The lower value is a maximum value that can normally be reliably achieved by most lamps. Many lamps achieve much better values. The upper value was measured with the "Philips Master LEDspot MV VLE D 5.3-50W GU10 827 36D" lamp.

The maximum power depends heavily on the LED, ESL/CFL lamp used (see dimmer tool).

The specified maximum load values apply for an ambient temperature of 35 °C.

The change in power in relation to the ambient temperature can be seen in the diagram below:



Ambient operating tempera-

ture: -5 °C to +45 °C

Max. humidity: 93% relative humidity, no moisture condensation

Environment: The device is designed for use at elevations up to 2000 m above sea level.

IP protection rating: IP 20

Connections

Inputs, outputs: Screw terminals

single-core: 1.5 mm² to 2.5 mm²

Finely stranded (with core end sleeve): 1.5 mm² to 2.5 mm²

KNX: Two 1 mm pins for bus connecting terminal

Protective functions: Electronic load detection, short-circuit, overload detection

Device width

MTN6710-0002: 4 modules = approx. 72 mm

MTN6710-0004: 8 modules = approx. 144 mm

Dimmer tool

Schneider Electric has tested numerous dimmable LED and energy saving lamps. The dimmer tool provides information on dimmable lamps and the minimum and maximum number of individual lamp models.



<http://schneider-electric.dimmer-test.com>

Schneider Electric Industries SAS

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

www.schneider-electric.com