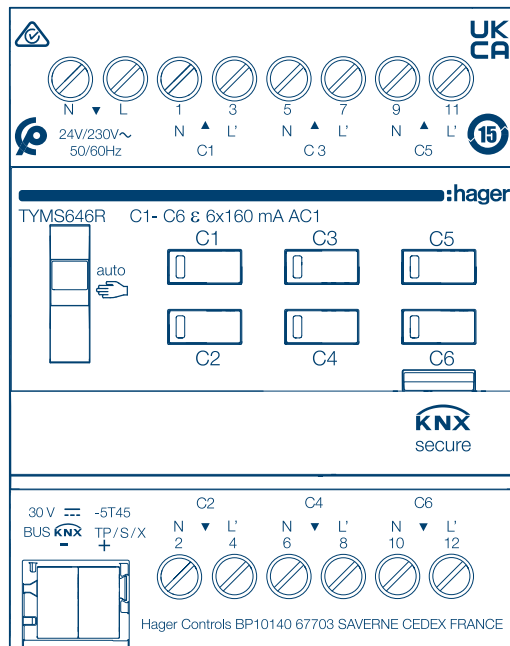


KNX building management system

KNX heating ac- tuator



KNX Secure heating actuator 6-gang, with controller for 24/230 V valve drives

TYMS646R

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1 Introduction

These instructions describe the safe and correct installation and commissioning of the KNX Secure heating actuator. These instructions are provided as information in addition to the product.

Symbols used

- Single-step instruction or any sequence.
- ① Multi-step instruction. Sequence must be maintained.
- List
- Reference to additional documents/information


















	Scope of delivery		Installation by a qualified electrician		For further information on configuring the device, refer to the application manual
	KNX-certified		Supports KNX Data Secure		
			Compatibility with KNX S-mode (ETS)		Compatibility with Hager Easytool
	Suitable for use in China		Suitable for use in Morocco		Suitable for use in Australia and New Zealand
	Suitable for use throughout Europe and Switzerland		Manufacturer's information is in accordance with § 18 Para. 4 of the German Electrical and Electronic Equipment Act		Suitable for use in England, Wales and Scotland


Table 1: Symbols used

Symbol	Warning word	Consequence of non-observance
	Danger	Leads to serious injuries or death.
	Warning	Can lead to serious injuries or death.
	Caution	Can lead to minor injuries.
	Caution	Can lead to device damage.
	Note	Can lead to physical damage.
Symbol	Description	
	Warning against electric shock.	

Introduction

Symbol	Description
	Warning against damage from electricity.
	Warning against damage from heating.

Target group



Electronic devices may only be assembled, installed and configured by an electrically trained and certified specialist in accordance with the relevant installation standards of the country. The accident prevention regulations valid in the appropriate countries must be complied with.

In addition, these instructions are intended for system administrators and electrically trained specialists.

2 Safety instructions

Electrical devices must only be installed and assembled by a qualified electrician in accordance with the relevant installation standards, guidelines, regulations, directives, safety and accident prevention directives of the country.

Hazard due to electric shock. Disconnect before working on the device or load. Take into account all circuit breakers that supply dangerous voltages to the device or load.

Failure to comply with these installation instructions may result in damage to the device, fire or other hazards.

Danger due to electric shock. The device is not suitable for safe disconnection or isolation of the mains supply.

Danger due to electric shock on the SELV/PELV installation. Not suitable for switching SELV/PELV voltages.

3 Scope of delivery

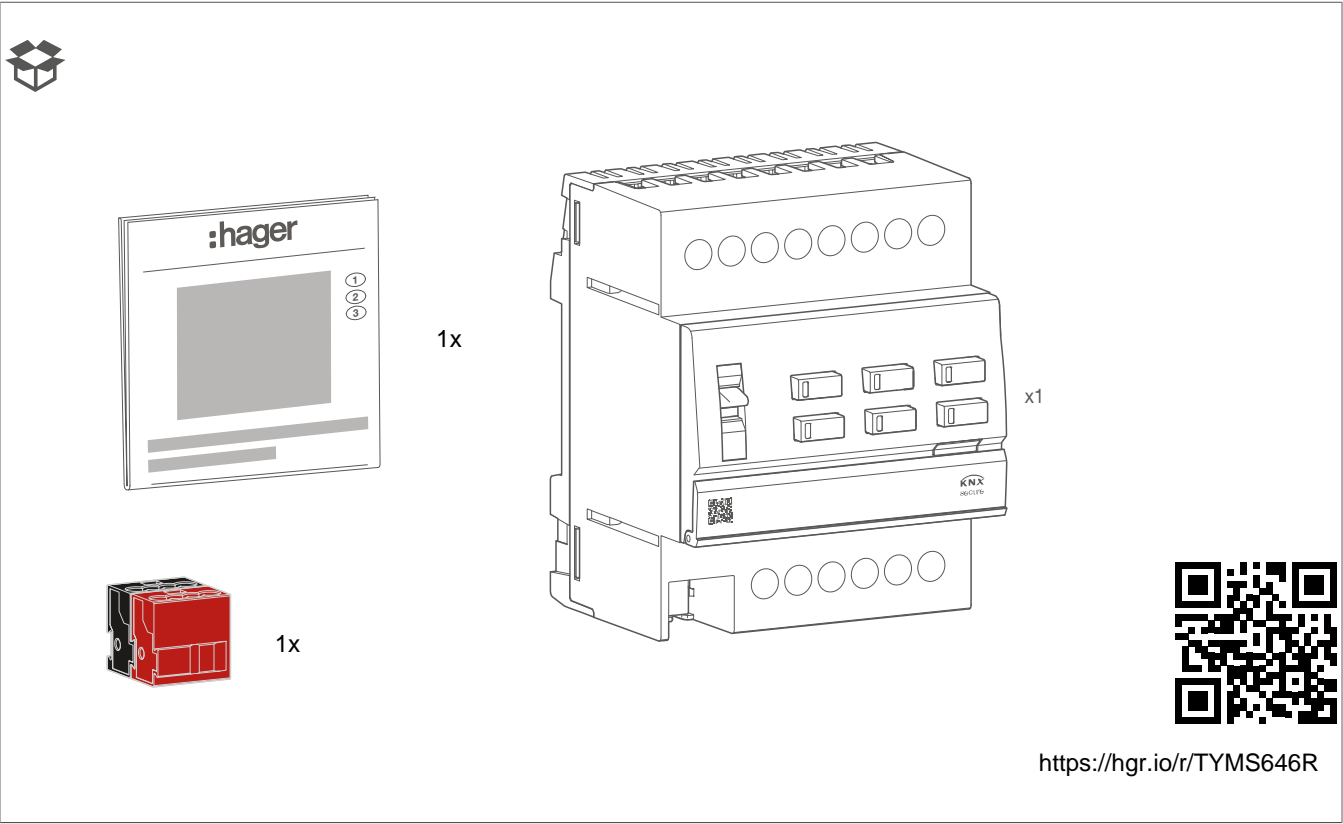


Fig. 1: TYMS646R scope of delivery

4 Design and layout of the device

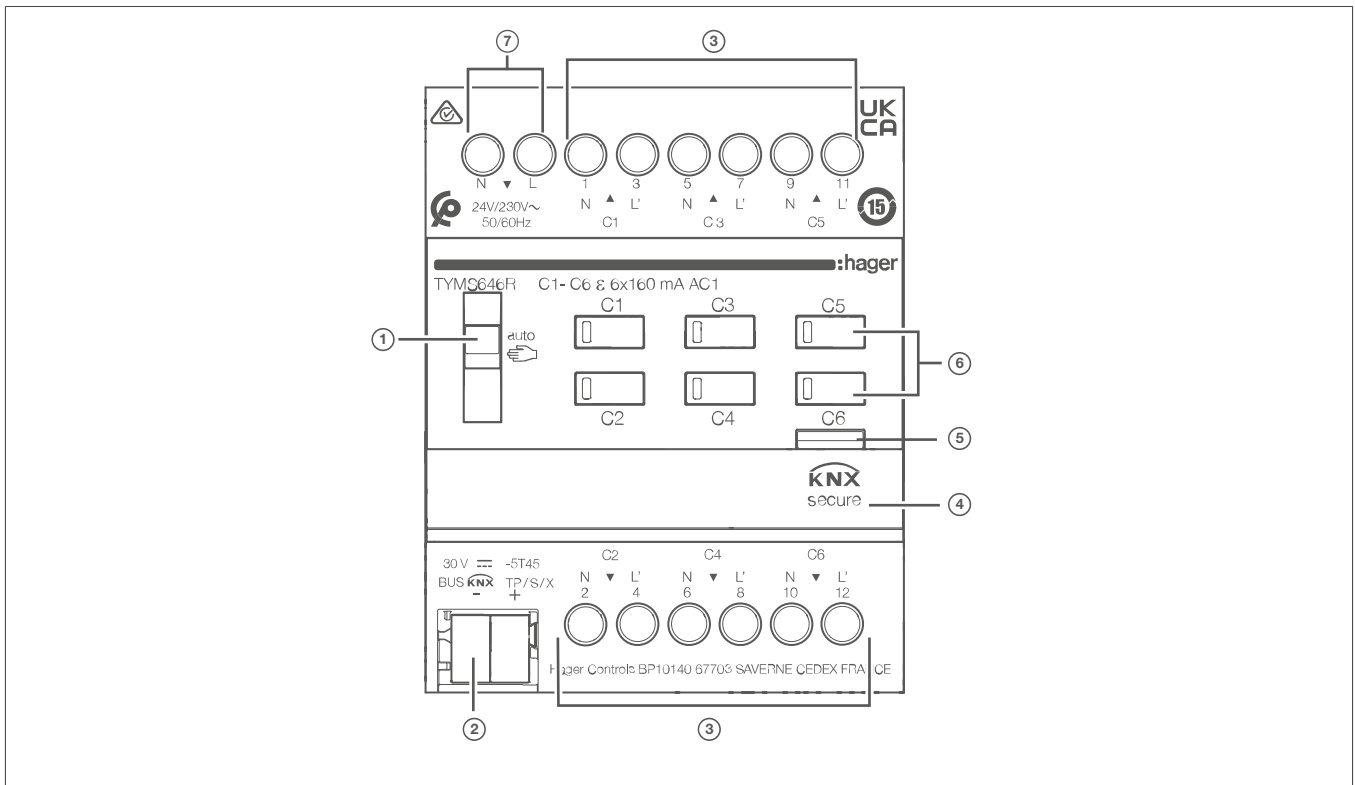


Fig. 2: Design and layout of the device: heating actuator

- ① Auto/Manu slide switch (auto/☞)
- ② KNX bus connection terminal
- ③ Thermal actuator connections,
 - top group: Outputs C1 + C3 + C5,
 - bottom group: Outputs C2 + C4 + C6
- ④ Labelling field
- ⑤ Illuminated programming button
- ⑥ Operation button for manual mode with status LED
- ⑦ Power supply connection (N, L)

5 Function

5.1 System information

This device is a product of the KNX system and corresponds to the KNX guidelines. Detailed specialised knowledge obtained from KNX training courses is required for understanding.

The device is KNX Data Secure-compatible. KNX Data Secure can be configured in the ETS project and offers protection against manipulation in building automation. Detailed knowledge on this subject is required. For KNX Secure commissioning, a device certificate (FDSK) is required, which is attached to the device (QR code label). During installation, the device certificate must be removed from the device and kept in a safe place.

The planning, installation and commissioning of the device are carried out with KNX-certified software.

5.2 systemlink commissioning

The function of the device is software-dependent. The software is to be obtained from the product database. You can find the latest version of the product database, technical descriptions as well as conversion and additional support programmes from our website.

5.3 easylink commissioning

The function of the device is configuration-dependent. The configuration can also be performed using devices developed specially for simple setting and commissioning.

This type of configuration is only possible with devices compatible with the easylink system. easylink stands for easy, visually supported commissioning. Preconfigured standard functions are assigned to the inputs/outputs by means of a service module.

5.4 Functional description

The device receives telegrams from sensors or other controls via the KNX installation bus and uses its 6 independent outputs to activate electrothermal valve drives for heating or cooling systems. Each output is able to activate 4 (230 V AC) or 2 (24 V DC) valve drives without noise. It is possible to connect valve drives that are both closed and open when voltage-free.

The actuator contains up to 12 room thermostats (RTs) that are integrated into the device software and operate independently. The variable outputs of these thermostats can be coupled with the electronic valve outputs of the actuator, which means that temperature control and valve activation can only take place through a bus device if required. It is not strictly necessary to use external room thermostats as the valve outputs can be activated individually via the KNX system. The integrated thermostats can also activate other heating actuators or fan coil actuators. The room temperature is made available to the integrated thermostats via separate communication objects. All thermostat functions (such as specifying the set temperature and changing the operating mode) are controlled via KNX communication objects (i.e. objects without their own control elements), enabling thermostat operation by means of thermostat extension units or visualisations.

5.5 Correct use

- Switching electrothermal valve drives (24/230 V AC) for heating systems or cooling ceilings
- Mounting on DIN rail according to IEC 60715

5.6 Product characteristics

- Switching operation or PWM operation
- Valve drives with closed when current-free or open when current-free characteristics can be activated
- 230 V or 24 V valve drives can be activated
- Outputs can be operated manually, building site operation
- Feedback in manual mode and in bus operation
- Individual outputs can be disabled manually or via bus
- Outputs are resistant to overload and short circuits
- Error messages indicated via status LEDs in operation buttons
- Protection against stuck valves
- Forced position
- Different setpoints for forced position or emergency operation in the event of bus failure, for summer and winter
- Cyclical monitoring of input signals, can be set
- Feedback via bus, e.g. in the event of power failure, overload or sensor failure
- Integrated room thermostatic control with setpoint specification
- Six independent thermostats for controlling up to six independent rooms
- Control function for heating and cooling operation



PWM operation: electrothermal valve drives only have “open” and “closed” positions. During PWM operation, almost constant behaviour is achieved as a result of switching on and off within the cycle time.

5.7 Overload and short circuit protection

In the event of an overload or a short circuit, the device identifies the output that is affected and switches it off in order to protect the device and the connected valve drives from destruction. Outputs that are not overloaded continue to operate so that the affected rooms are still heated.

- In the event of significant overloads, the actuator initially switches off all **C1–C6** outputs.
- In the event of less significant overloads, the actuator switches off output groups **C1 + C3 + C5** and **C2 + C4 + C6**.
- Over up to 4 test cycles, the actuator identifies the overloaded output.
- If none of the outputs can be identified definitively as overloaded in the event of a less significant overload, the actuator switches off the individual outputs one by one.
- The overload can be reported to the bus for any output.

LED display

- Overload LED flashes slowly: test cycle active.
- Overload LED flashes quickly: test cycle complete.

6 Operation

Operating modes

- Bus operation: operation via push-buttons or other bus devices
- Manual mode: manual operation on the device



Bus operation is not possible in manual mode.

Manual mode is possible in the event of bus failure.

The behaviour before a bus failure, and in the event of repeated bus failures, can be set.

Manual mode can be disabled during operation by means of a bus telegram.

Operating outputs in manual mode

☑ Bus voltage supply is present.

- Move the switch (1) to the position.
Manual mode is switched on; the outputs can be controlled independently of each other via the operation buttons ((6)).
- When manual operation button Cx is pressed for the first time, the output status switches to 0%.
The connected valve drive closes the valve.
- When manual operation button Cx is pressed for the second time, the output status switches to 50%.
The connected valve drive opens the valve to 50% of the stroke.
- When manual operation button Cx is pressed for the third time, the output status switches to 100%.
The connected valve drive opens the valve completely.
This cycle repeats itself after the manual operation button is pressed for the third time.



The cycle time for manual mode can be set in the ETS parameters. The factory setting is 20 min.

6.1 Status indicator and output behaviour

Status LEDs C1–C6 ([Bild 2/6](#)) indicate whether the current flow is switched on or off at the affected output. The connected heating or cooling valves open and close according to their characteristic.

Valve drive type	Status LED ON	Status LED OFF
Closed when current-free	Heating/cooling Valve open	Off Valve closed
Open when current-free	Off Valve closed	Heating/cooling Valve open

Table 2: Status indicator and output behaviour
















Status LED in manual operation button Cx		Functional description
Cx 		Heating mode OK
		Heating in safety mode
Cx 		Cooling mode OK
		Cooling in safety mode
Cx 		Short circuit detection running
		Short circuit detected
		Overload detected, load shedding running
C1–C6 		Current loss (lighting switched from C1 to C6 until there is a return to the main current supply)
C1–C6 		Manual mode, output 50%
		Manual mode, output 100%

Table 3: Status indicator

7 Information for qualified electricians

7.1 Installation and electrical connection



Danger

Electric shock when live parts are touched!
An electric shock can lead to death!

- Isolate all connection cables before working on the device and cover any live parts in the area!



Caution

Impermissible heating if load of the device is too high!
The device and the connected cables may get damaged in the connection area!

- Do not exceed the maximum current carrying capacity!

7.1.1 Installing the device



Observe temperature range. Provide sufficient cooling.

- Install the device on a TH 35 7.5–15 DIN rail according to IEC 60715:2017 / EN 60715:2017.

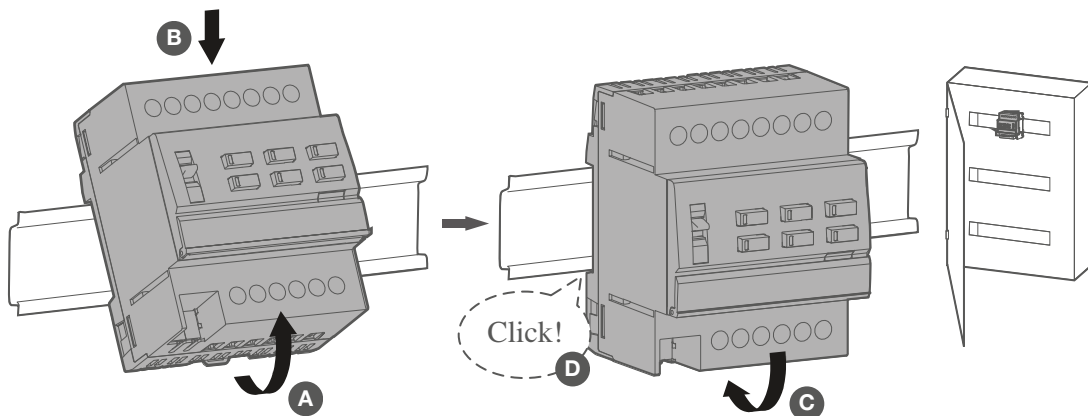
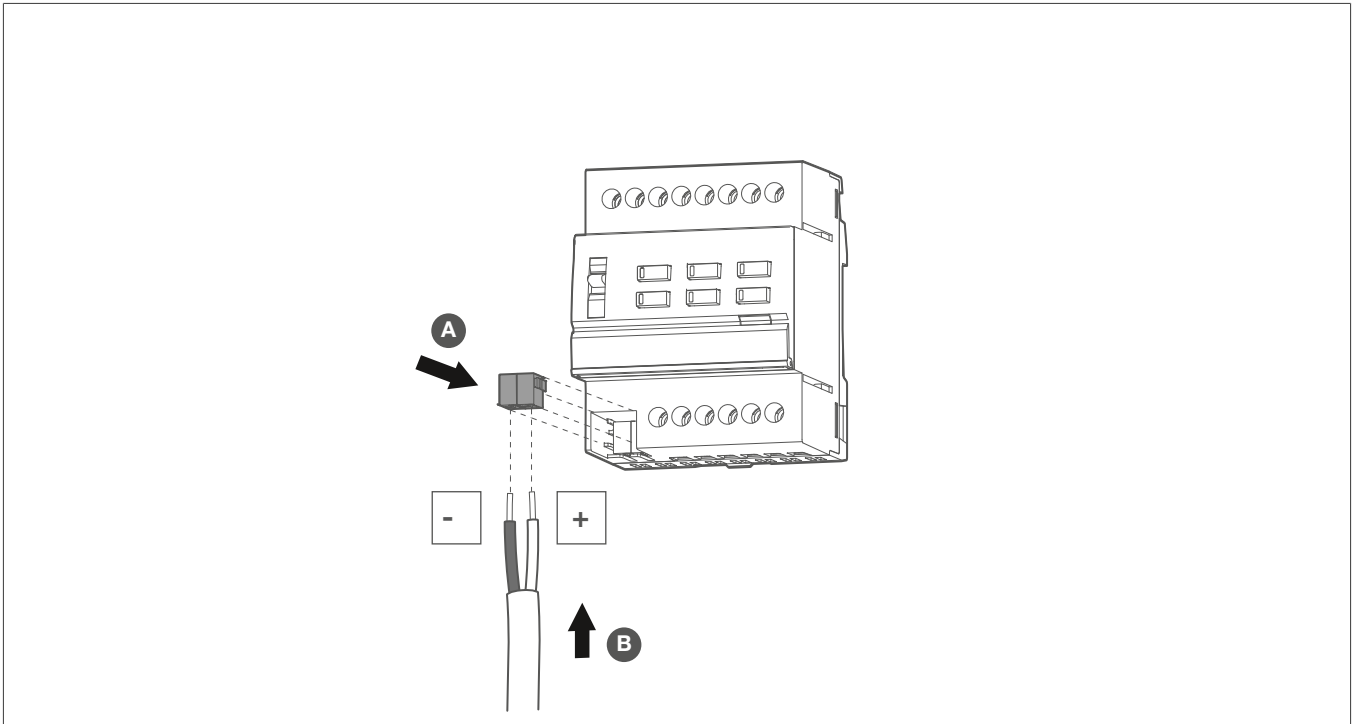


Fig. 3: Installing the device

7.1.2 Connecting the bus cable

- Connect the bus cable via the bus connection terminal (Bild 0).



7.1.3 Connecting the device

- ☑ The device has been installed correctly.
- ☑ The bus connection cable is connected.



Only connect valve drives of the same type (either 230 V AC or 24 V DC) to all channels.

In each channel, only connect valve drives of the same type (closed when current-free or open when current-free). Do not connect any other loads.

Observe the maximum number of valve drives per channel.

In rooms that are susceptible to frost, connect the valve drives to channels C1 and C4. These channels are switched off last when an overload is detected.

Observe the technical data for the valve drives.

- 1 Connect the 230 V AC valve drives to the device according to the connection diagram ((Bild 4: Connection diagram for valve drives with 230 V~ power supply)).
- 2 Connect the 230 V AC power supply (L-N) to the device.

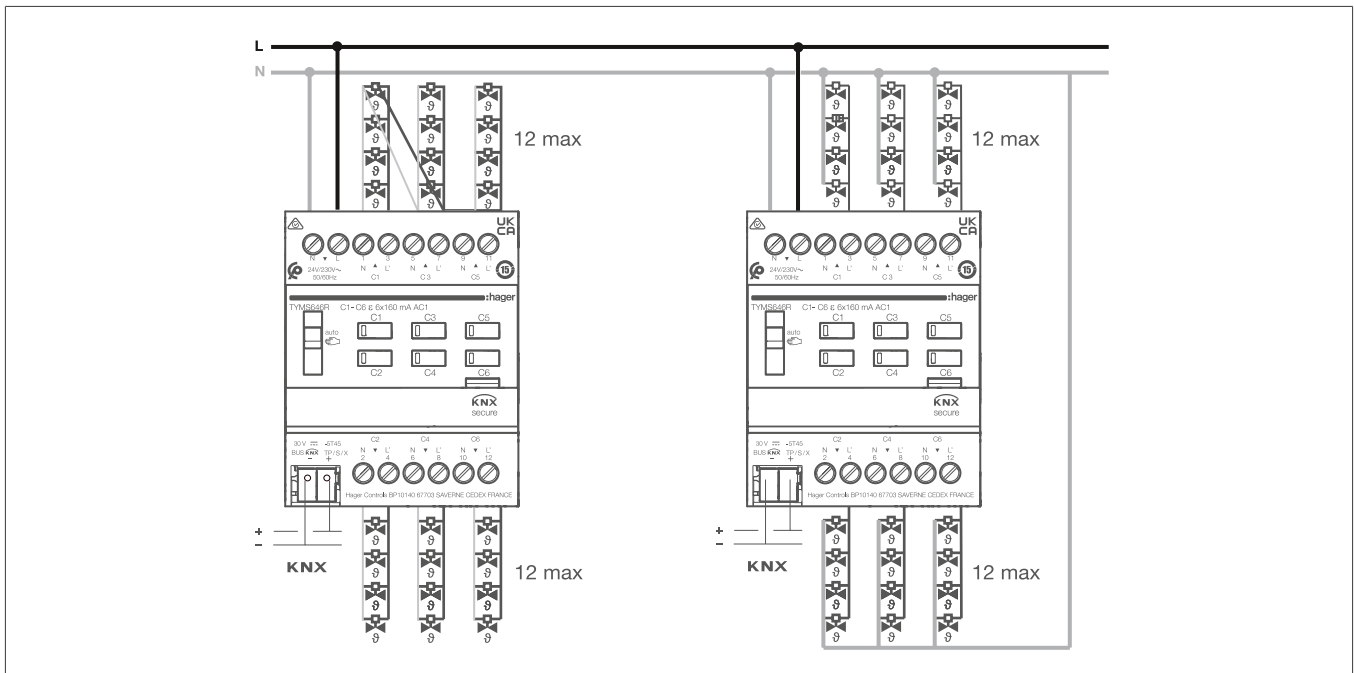


Fig. 4: Connection diagram for valve drives with 230 V~ power supply

OR:

- 3 Connect the 24 V DC valve drives to the device according to the connection diagram ((Bild 5: Connection diagram for valve drives with 24 V~ power supply)).
- 4 Connect the 24 V DC power supply (L-N) to the device.

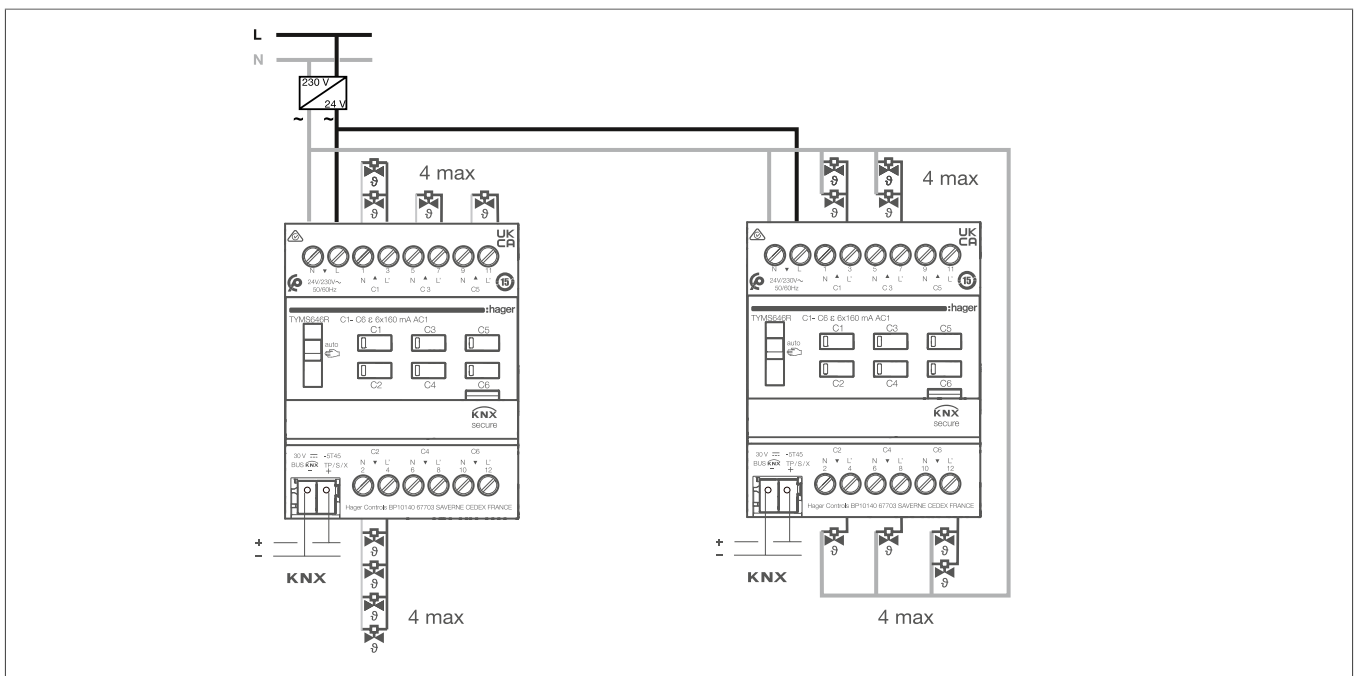


Fig. 5: Connection diagram for valve drives with 24 V~ power supply

7.1.4 Dimensioning the number of valve drives

- ☑ The following conditions must be met and checked to ensure that the device can be operated safely and without errors:

- The maximum number of valve drives per **Cx** output must be adhered to.
- For each **Cx** output, the valve drives that are being used must be identical to the technical data.
- The maximum number of valve drives per group must be adhered to.
 - Top group: outputs C1 / C3 / C5
 - Bottom group: outputs C2 / C4 / C6

The specifications in the table must be applied in order to use Hager valve drives TGG641A (230 V~) or TGG641B (24 V~).

	Per output	Per group with 3 outputs
Maximum number of TGG641A valve drives (230 V~)	4	12
Maximum number of TGG641B valve drives (24 V~)	4	4

Table 4: Number of valve drives

Valve drives with 230 V~	I_{\max} C1/C2/C3/C4/C5/C6	I_{\max} C1+C3+C5 / C2+C4+C6
1 $t < 200$ ms	2.2 A	6.6 A
2 200 ms $< t < 4.30$ min	0.6 A	1.8 A
3 $t > 4.30$ min	45 mA	135 mA

Table 5: Current consumption, 230 V~ valve drives

Valve drives with 24 V~	I_{\max} C1/C2/C3/C4/C5/C6	I_{\max} C1+C3+C5 / C2+C4+C6
1 $t < 200$ ms	2.2 A	6.6 A
2 200 ms $< t < 4.30$ min	0.9 A	0.9 A
3 $t > 4.30$ min	500 mA	500 mA

Table 6: Current consumption of 24 V~ valve drives

In the case of valve drives from other manufacturers, the maximum current consumption must be adhered to. The current consumption of a valve drive can be divided into three phases (see Fig. 6):

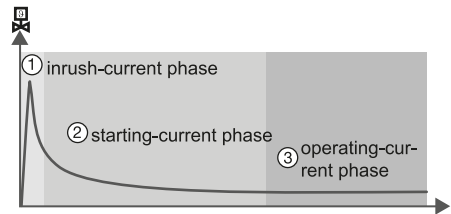


Fig. 6: Current consumption of valve drives

- Making current phase ①
- Starting current phase ②
- Operating current phase ③



Note!

Depending on the brand, the maximum current consumption may be different over these 3 phases, and the duration of the 3 phases may be different.

To operate the system correctly, the values in tables [siehe Tab. 5/](#) [siehe Tab. 6](#) and the technical data sheet for the valve drive must be adhered to.

7.1.5 Connecting 230 V~ valve drives

- Connect the 230 V~ mains voltage according to the connection diagram ([Bild 7](#)).
- Connect the valve drives according to the connection diagram ([Bild 7](#)).

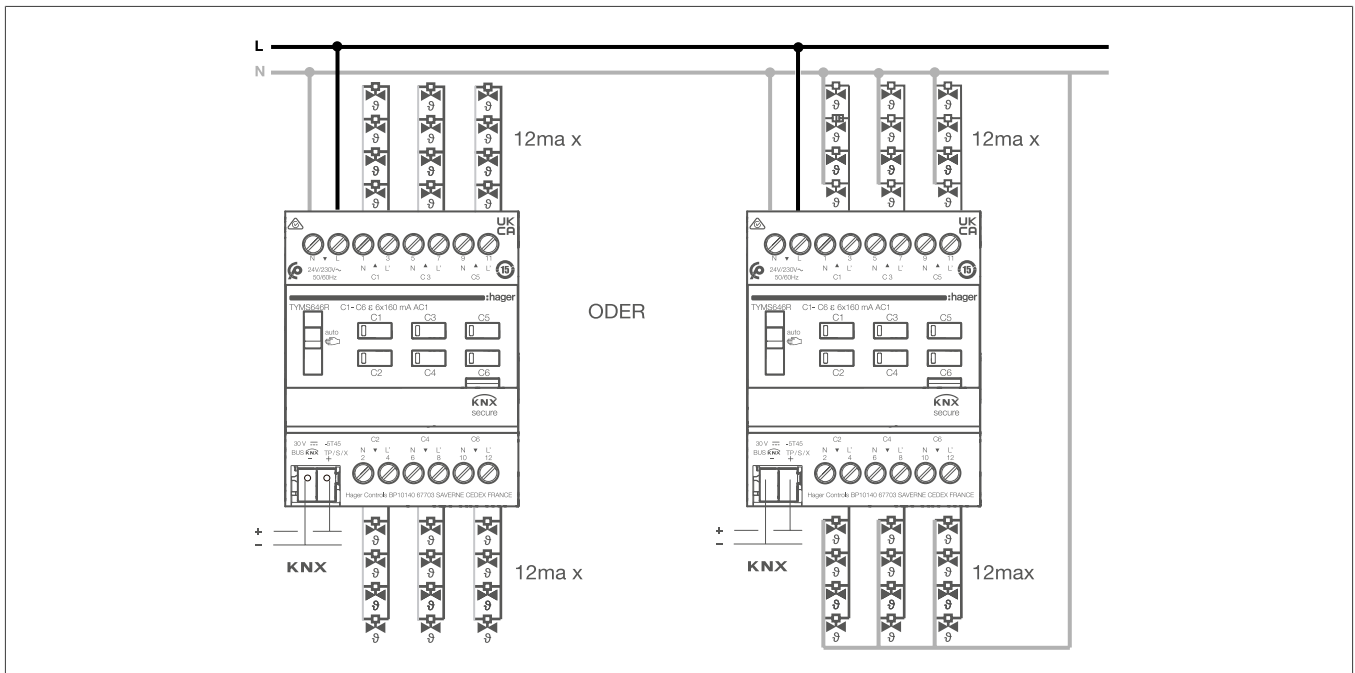


Fig. 7: Connection diagram for valve drives with 230 V~ power supply

A maximum of 4 valve drives of the same type may be connected per output.

A maximum of 12 valve drives of the same type may be connected per output group.

7.1.6 Connecting 24 V~ valve drives

- Connect the 24 V~ mains voltage according to the connection diagram (Fig. 8).
- Connect the valve drives according to the connection diagram (Fig. 8).

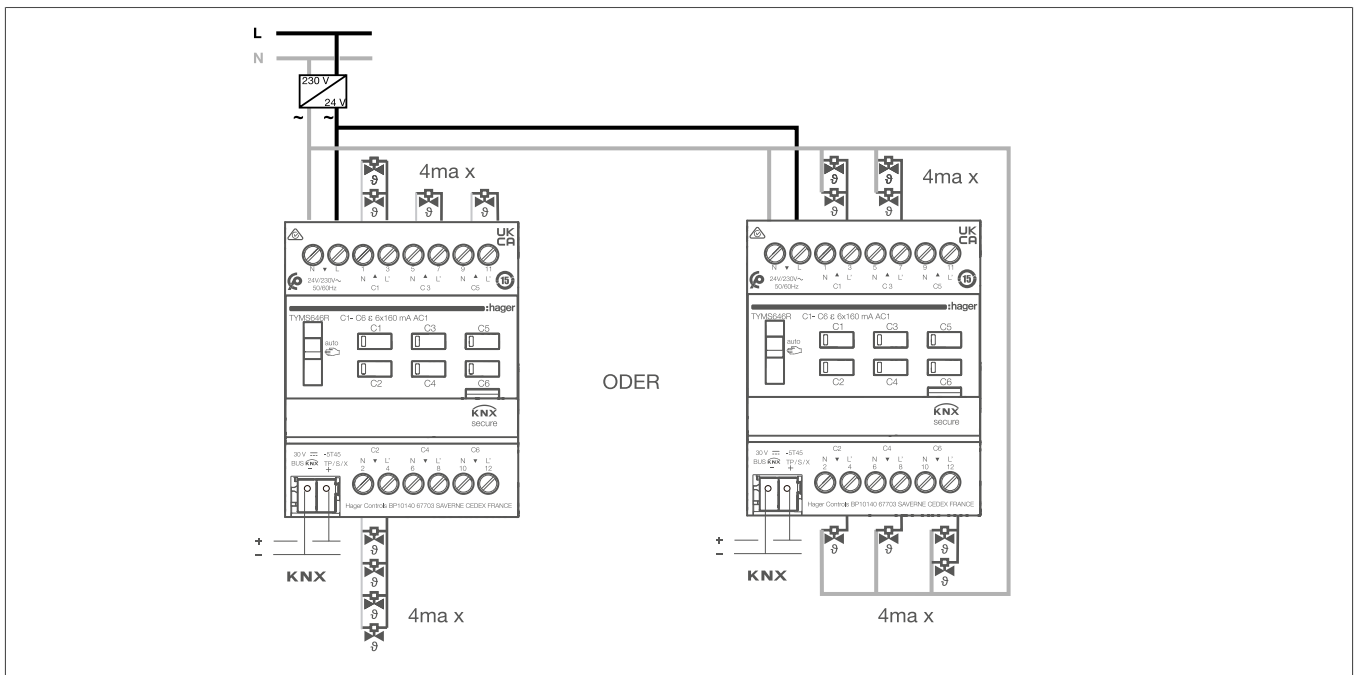


Fig. 8: Connection diagram for valve drives with 24 V~ power supply

A maximum of 4 valve drives of the same type may be connected per output.

A maximum of 12 valve drives of the same type may be connected per output group.

7.2 Commissioning

The device can be programmed in three ways:

- KNX systemlink mode (standard ETS programming) [siehe Commissioning in systemlink , Seite 20](#)
- KNX Secure mode [siehe Commissioning in KNX Secure mode , Seite 20](#)
- KNX easylink mode [see easylink commissioning , page 21](#)

7.2.1 Commissioning in systemlink

☑ The slide switch for manual mode ([Bild 2/1](#)) is in position **auto**.

- 1 Switch on the mains voltage.
- 2 Switch on the bus voltage.
- 3 Press the programming button ([Bild 2/5](#)).

The button lights up.



Note!

If the button does not light up, no bus voltage is present on the device.

- 4 Load the physical address into the device.
Status LED of the button goes out.
- 5 Note down the physical address on the labelling field ([Bild 2/4](#)).
- 6 Load the application software into the device.

7.2.2 Commissioning in KNX Secure mode

☑ Das Gerät ist betriebsbereit eingebaut und angeschlossen.

- 1 Den sicheren Inbetriebnahmestatus in der ETS aktivieren.
- 2 Das Gerätezertifikat (QR-Code) eingeben ([Bild 11](#)) oder scannen ([Bild 10](#)) bzw. dem Projekt in der ETS hinzufügen.



Hinweis!

Zum Scannen des QR-Codes ist eine hochauflösende Kamera zu verwenden.

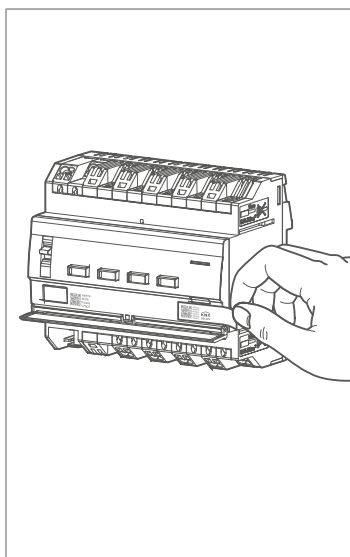


Fig. 9: Gerätezertifikat vom Gerät entfernen (Abbildung ähnlich)

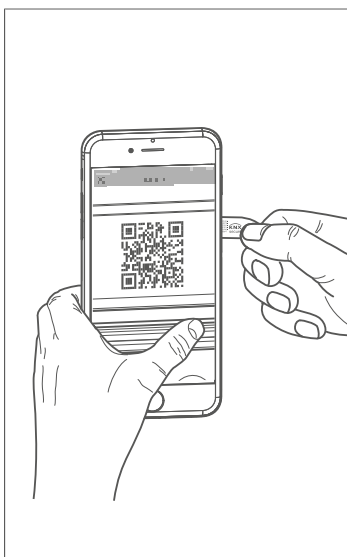


Fig. 10: QR-Code scannen

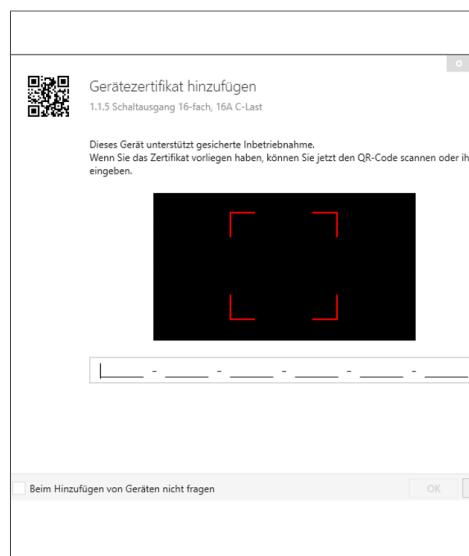


Fig. 11: QR-Code manuell eingeben

- 3 Alle Passwörter dokumentieren und sicher aufbewahren.
- 4 Das Gerätezertifikat (QR-Code) vom Gerät entfernen und sicher mit den Passwörtern aufbewahren.
- 5 Das Gerätezertifikat mit physikalischer Adresse und Produktreferenz in einer Liste notieren.

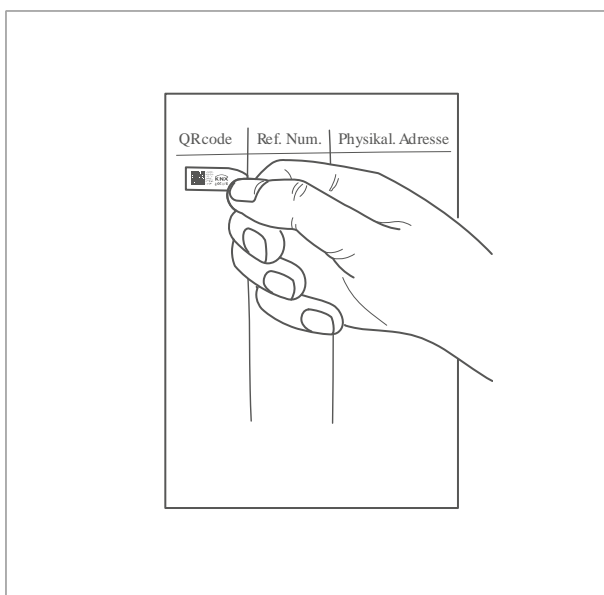


Fig. 12: Gerätezertifikat in die Projektdokumentation einkleben

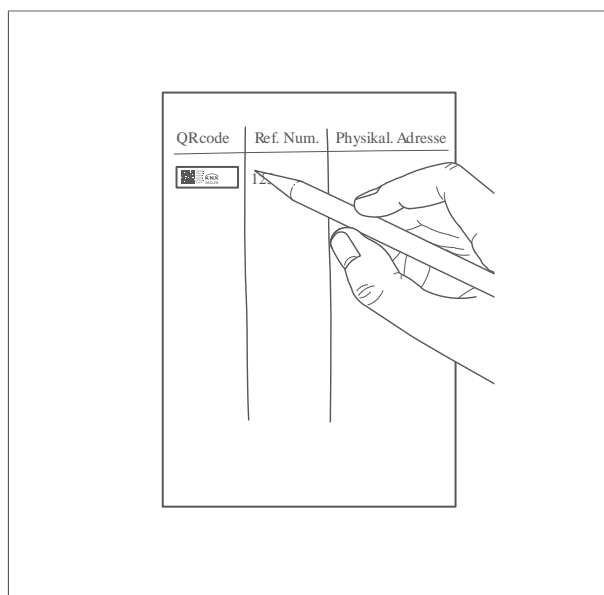


Fig. 13: Artikelnummer und physikalische Adresse zum Gerätezertifikat notieren

7.2.3 easylink commissioning

The function of the device is configuration-dependent. The configuration can also be performed using devices developed specially for simple setting and commissioning.

This type of configuration is only possible with devices compatible with the easylink system. easylink stands for easy, visually supported commissioning. Preconfigured standard functions are assigned to the inputs/outputs by means of a service module.

7.2.4 Commissioning the device

☑ The device has been installed and connected correctly.

- Switch on the mains voltage.
- Switch on the bus voltage.

Depending on the parameterisation, the status LEDs of the operation buttons for manual mode light up.



The loading of non-compatible application software is indicated by red flashing of the status LEDs (Bild 2/6).

7.2.4.1 Functional test

Functional test


The functionality of the outputs is displayed via the status LED of the operation button (Bild 2/6).

LED status	Meaning of the signal
LED lights up permanently	Load is activated
LED flashes	No load connected

Table 7: Functionality of the outputs

The individual outputs can be switched in manual mode via the operation button (Fig. 2/6).

- ☑ The device has been installed and connected correctly.
- ☑ The mains and bus voltage are switched on.
- ☑ The load is switched off.

- Move the slide switch (Bild 2/1) to the manual mode  position.
- Press the manual operation button (Fig. 2/6) briefly (< 2 s) for the first time.
The connected output switches its status to 0%.
- Press the manual operation button briefly for a second time.
The connected output switches its status to 50%.
- Press the manual operation button briefly for a third time.
The connected output switches its status to 100%.

This cycle repeats itself after the manual operation button is pressed for the third time.

8 Dismantling



Danger

Electric shock when live parts are touched!

An electric shock can lead to death!

- Isolate all connection cables before working on the device and cover any live parts in the area!

8.1 Disconnecting the load cables

- ☑ All the cables delivering voltage to the device are switched off.
- Unscrew and remove the connection cables from the device.

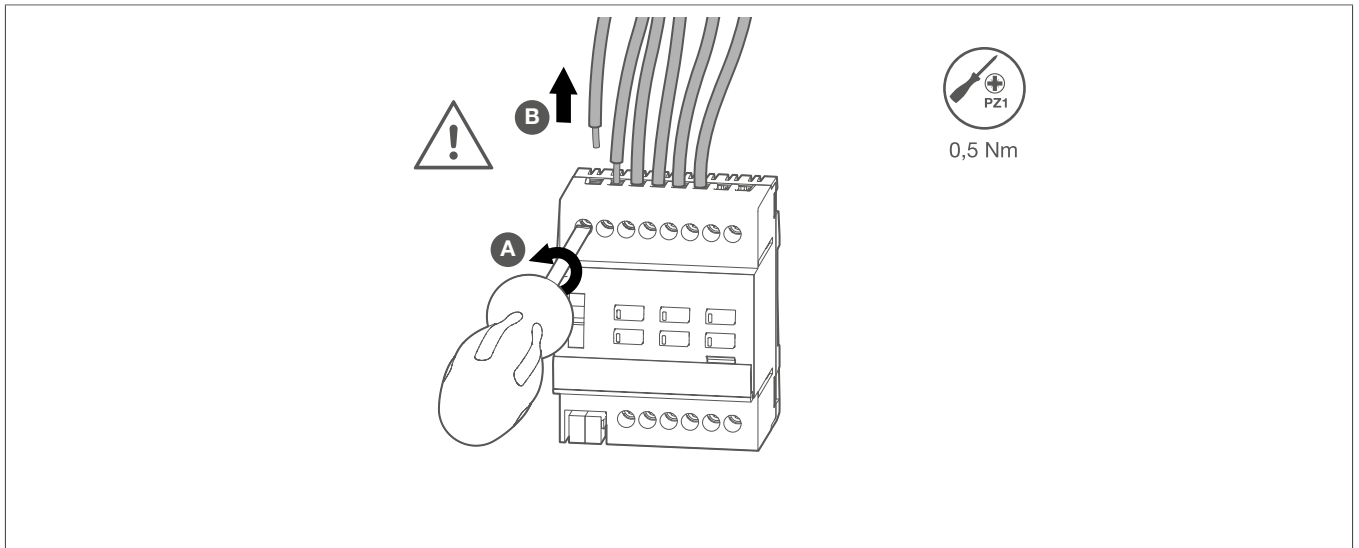


Fig. 14: Disconnecting the load cables

8.2 Removing the bus connection terminal

- ☑ The bus voltage is switched off.
- Remove the bus connection terminal from the device.

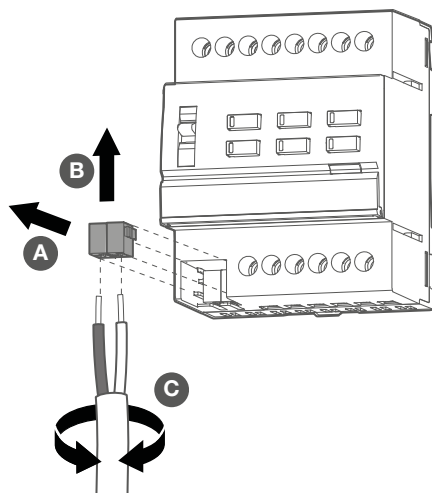


Fig. 15: Removing the bus connection terminal

8.3 Dismantling the device

☑ The bus connection cable and the load cables have been disconnected.

- Remove the device from the DIN rail.

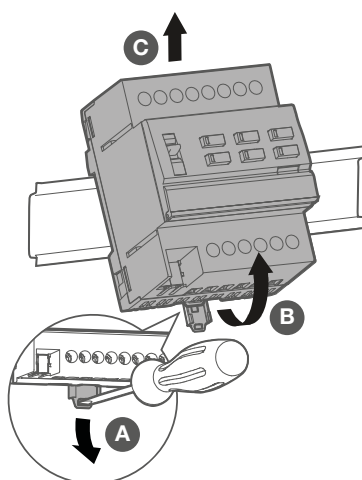



Fig. 16: Dismantling the device



Dispose of the device in line with the corresponding guidelines of the country ([siehe Disposal](#)) or, if you have a warranty claim, contact the point of sale ([siehe Warranty](#)).

9 Appendix

9.1 Technical data

KNX Medium	TP1-256
Commissioning mode	systemlink, easylink
KNX supply voltage	21–32 V  SELV
BUS connection mode	Connecting terminal
Supply voltage of the product and the valve drives	
– 230 V~ +10/-15%, 50/60 Hz	
– 240 V~ +/- 6%, 50/60 Hz	
– 24 V~ +/- 5%, 50/60 Hz	
Protection switch	16 A
Operating height	Max. 2000 m
Contamination level	2
Surge voltage	4 kV
Degree of protection of housing	IP20
Degree of protection of housing under front plate	IP30
Impact protection	IK04
Overvoltage class	III
Operating temperature	-5° ... +45°C
Storage/transport temperature	-20° ... +70°C
Action type	2Y
Voltage and current signalled for EMC testing of interference radiation	230 V~, 1 A / 24 V~, 1 A
Connection capacity screw terminals	
Rigid	0.5 ... 4 mm ²
Flexible, with conductor sleeve	0.5 ... 4 mm ²
KNX current consumption	
Typical	18.5 mA
In idle state	5 mA
Max. tightening torque	0.5 Nm
Phillips type	PZ1
Standards	EN 50491-3; EN 60669-2-1
Dimensions	4 modules, 4 x 17.5 mm

9.2 Troubleshooting

Manual operation not possible.

Cause 1: Switch (1) not set to .

 Set switch to .


Cause 2: Manual operation is not enabled (systemlink).

 Enable manual operation via application software.

Bus operation is not possible

Cause 1: Bus voltage is not present.

 Check bus connection terminals for correct polarity.

 Check bus voltage by briefly pressing the programming button (5), red LED lights up if bus voltage is present.

Cause 2: Manual mode is active.

 Switch (1) is in position . Move switch (1) to position **auto**.

Valve drives for an output or all outputs do not switch.

Cause: An output is overloaded.

💡 Determine the cause of the overload switch-off. Resolve short circuits; replace defective valve drives. Check and, if necessary, reduce the number of valve drives connected to the output. Do not exceed the maximum switching current.

💡 Reset the overload switch-off: disconnect the device from the mains entirely for around 5 seconds and switch off the automatic cutout. Then switch it back on.

Cause 2: Manual mode is active.

💡 Switch (1) is in position . Move switch (1) to position **auto**.



Note!

In the event of an overload, one or both output groups switch off initially for around 6 minutes. The device then identifies the overloaded output and switches it off permanently. This idle and test phase typically lasts 6–20 minutes.

Once the overload switch-off has been reset, it is not possible for the device to identify an overloaded output retroactively. The overload switch-off will occur again unless the cause is resolved.

9.3 Accessories

230 V~ valve drive	TGG641A
24 V~ valve drive	TGG641B
Safety transformer 230 V/12+24 V 25 VA	ST312
Safety transformer 230 V/12+24 V 40 VA	ST314
Safety transformer 230 V/12+24 V 63 VA	ST315

9.4 Regulatory Compliance Australia

9.5 Disposal



Correct disposal of this product (electrical waste).

(Applicable in the European Union and other European countries with separate collection systems.)

This marking shown on the product or its documentation indicates that it should not be disposed of with other household waste at the end of its working life. To prevent possible harm to the environment or human health from uncontrolled waste disposal, please separate this device from other types of waste. Recycle the device responsibly to promote the sustainable reuse of material resources.

Household users should contact either the dealer where they purchased this product, or their local government office, for details of where and how they can take this device for environmentally safe recycling.

Commercial users should contact their supplier and check the terms and conditions of the purchase contract. This product should not be mixed with other commercial waste for disposal.

9.6 Warranty

We reserve the right to implement technical and formal changes to the product in the interest of technical progress.

Our products are under guarantee within the scope of the statutory provisions.

If you have a warranty claim, please contact the point of sale.



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