

Documentation | EN

KL26xx/KS26xx

Relais Output Terminals

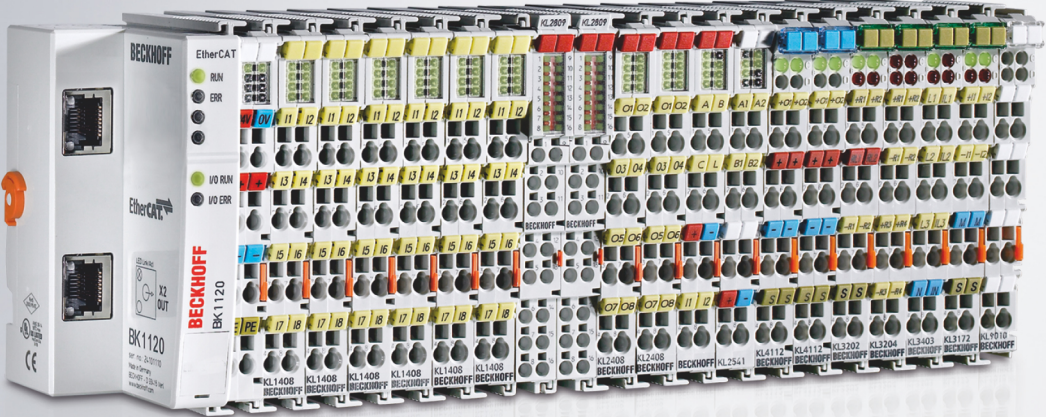


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1 Foreword

1.1 Notes on the documentation

Intended audience

This description is only intended for the use of trained specialists in control and automation engineering who are familiar with the applicable national standards.

It is essential that the documentation and the following notes and explanations are followed when installing and commissioning these components.

It is the duty of the technical personnel to use the documentation published at the respective time of each installation and commissioning.

The responsible staff must ensure that the application or use of the products described satisfy all the requirements for safety, including all the relevant laws, regulations, guidelines and standards.

Disclaimer

The documentation has been prepared with care. The products described are, however, constantly under development.

We reserve the right to revise and change the documentation at any time and without prior announcement.

No claims for the modification of products that have already been supplied may be made on the basis of the data, diagrams and descriptions in this documentation.

Trademarks

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1.2 Safety instructions

Safety regulations

Please note the following safety instructions and explanations!
Product-specific safety instructions can be found on following pages or in the areas mounting, wiring, commissioning etc.

Exclusion of liability

All the components are supplied in particular hardware and software configurations appropriate for the application. Modifications to hardware or software configurations other than those described in the documentation are not permitted, and nullify the liability of Beckhoff Automation GmbH & Co. KG.

Personnel qualification

This description is only intended for trained specialists in control, automation and drive engineering who are familiar with the applicable national standards.

Description of instructions

In this documentation the following instructions are used.
These instructions must be read carefully and followed without fail!

DANGER

Serious risk of injury!

Failure to follow this safety instruction directly endangers the life and health of persons.

WARNING

Risk of injury!

Failure to follow this safety instruction endangers the life and health of persons.

CAUTION

Personal injuries!

Failure to follow this safety instruction can lead to injuries to persons.

NOTE

Damage to environment/equipment or data loss

Failure to follow this instruction can lead to environmental damage, equipment damage or data loss.



Tip or pointer

This symbol indicates information that contributes to better understanding.

1.3 Documentation Issue Status

| Version | Comment |
|---------|---|
| 2.5.0 | <ul style="list-style-type: none"> • KL2612 added • KL2631 added • KL2641 added • Technical data updated • Ex-markings added to the technical data • Chapter <i>ATEX – special conditions (standard temperature range)</i> added • Chapter <i>Disposal</i> added • Document structure updated • New title page |
| 2.4.0 | <ul style="list-style-type: none"> • Chapter <i>Notes on ESD protection</i> updated • Chapter <i>Beckhoff Identification Code (BIC)</i> added |
| 2.3.0 | <ul style="list-style-type: none"> • Technical data updated |
| 2.2.0 | <ul style="list-style-type: none"> • KL2634 added • Chapter <i>Notes on ESD protection</i> added • Chapter <i>Remark about the use of relay terminals</i> updated • Document structure updated |
| 2.1.1 | <ul style="list-style-type: none"> • Chapter <i>Notes on the contact-protecting switching of the KL26x2-0010</i> updated • Technical data updated |
| 2.1.0 | <ul style="list-style-type: none"> • Chapter <i>Connection</i> updated • Technical data updated |
| 2.0.0 | <ul style="list-style-type: none"> • Migration • KL2602-0010 and KL2612-0010 added |
| 1.4 | <ul style="list-style-type: none"> • Technical data updated • ATEX notes added |
| 1.3 | <ul style="list-style-type: none"> • Foreword updated • LED prism graphics adapted |
| 1.2 | <ul style="list-style-type: none"> • Technical data updated • Preface and appendix added • English translation available |
| 1.1 | <ul style="list-style-type: none"> • Company renamed Beckhoff Automation GmbH • layout updated |
| 1.0 | <ul style="list-style-type: none"> • First release |

Firmware and hardware versions

The firmware and hardware versions (delivery state) can be taken from the serial number printed on the side of the terminal.

Syntax of the serial number

Structure of the serial number: WW YY FF HH
 WW - week of production (calendar week)
 YY - year of production
 FF - firmware version
 HH - hardware version

Example with serial number 40 15 1A 00:
 40 - week of production 40
 15 - year of production 2015
 1A - firmware version 1A
 00 - hardware version 00

1.4 Beckhoff Identification Code (BIC)

The Beckhoff Identification Code (BIC) is increasingly being applied to Beckhoff products to uniquely identify the product. The BIC is represented as a Data Matrix Code (DMC, code scheme ECC200), the content is based on the ANSI standard MH10.8.2-2016.

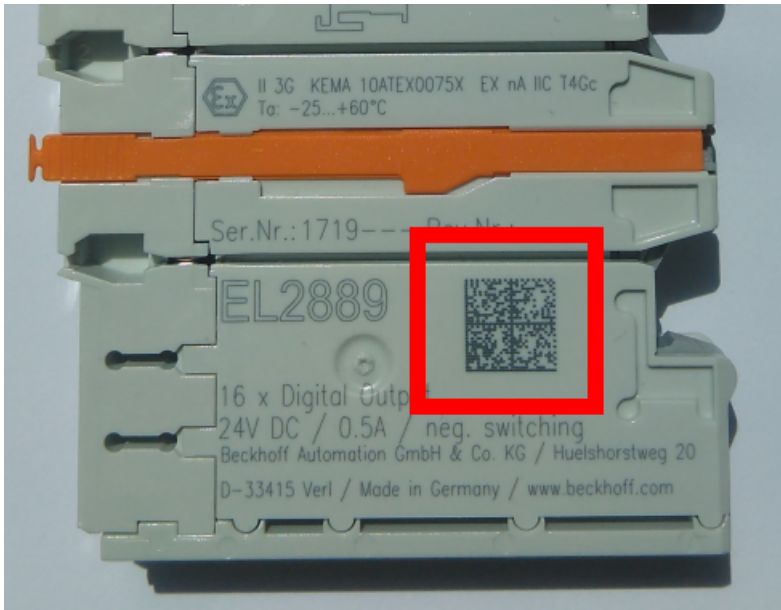


Fig. 1: BIC as data matrix code (DMC, code scheme ECC200)

The BIC will be introduced step by step across all product groups.

Depending on the product, it can be found in the following places:

- on the packaging unit
- directly on the product (if space suffices)
- on the packaging unit and the product

The BIC is machine-readable and contains information that can also be used by the customer for handling and product management.

Each piece of information can be uniquely identified using the so-called data identifier (ANSI MH10.8.2-2016). The data identifier is followed by a character string. Both together have a maximum length according to the table below. If the information is shorter, spaces are added to it. The data under positions 1 to 4 are always available.

The following information is contained:

| Item no. | Type of information | Explanation | Data identifier | Number of digits incl. data identifier | Example |
|----------|------------------------------------|---|-----------------|--|-------------------------|
| 1 | Beckhoff order number | Beckhoff order number | 1P | 8 | 1P 072222 |
| 2 | Beckhoff Traceability Number (BTN) | Unique serial number, see note below | S | 12 | S BTNk4p562d7 |
| 3 | Article description | Beckhoff article description, e.g. EL1008 | 1K | 32 | 1K EL1809 |
| 4 | Quantity | Quantity in packaging unit, e.g. 1, 10, etc. | Q | 6 | Q 1 |
| 5 | Batch number | Optional: Year and week of production | 2P | 14 | 2P 401503180016 |
| 6 | ID/serial number | Optional: Present-day serial number system, e.g. with safety products or calibrated terminals | 51S | 12 | 51S 678294104 |
| 7 | Variant number | Optional: Product variant number on the basis of standard products | 30P | 32 | 30P F971, 2*K183 |
| ... | | | | | |

Further types of information and data identifiers are used by Beckhoff and serve internal processes.

Structure of the BIC

Example of composite information from item 1 to 4 and 6. The data identifiers are marked in red for better display:

BTN

An important component of the BIC is the Beckhoff Traceability Number (BTN, item no. 2). The BTN is a unique serial number consisting of eight characters that will replace all other serial number systems at Beckhoff in the long term (e.g. batch designations on IO components, previous serial number range for safety products, etc.). The BTN will also be introduced step by step, so it may happen that the BTN is not yet coded in the BIC.

| |
|--|
| NOTE |
| This information has been carefully prepared. However, the procedure described is constantly being further developed. We reserve the right to revise and change procedures and documentation at any time and without prior notice. No claims for changes can be made from the information, illustrations and descriptions in this information. |

2 Product overview

| Terminal | Chan-nels | Nominal voltage | Comment |
|---|-----------|---|---|
| KL2602-0000 , KS2602-0000 [▶ 11] | 2 | 250 V _{AC} , 30 V _{DC} | Make contacts |
| KL2602-0010 , KS2602-0010 [▶ 11] | 2 | 230 V _{AC} | Make contacts, contact-protecting switching of LED lamps |
| KL2612-0000 , KS2612-0000 [▶ 15] | 2 | 125 V _{AC} , 30 V _{DC} | Changeover contacts |
| KL2622-0000 , KS2622-0010 [▶ 11] | 2 | 250 V _{AC} , 30 V _{DC} | Potential-free make contacts, without power contacts |
| KL2622-0010 , KS2622-0010 [▶ 11] | 2 | 250 V _{AC} , 30 V _{DC} | Make contacts, contact-protecting switching of LED lamps, without power contacts, |
| KL2631-0000 , KS2631-0000 [▶ 17] | 1 | 400 V _{AC} , 300 V _{DC} | Make contacts for power contact |
| KL2634-0000 , KS2634-0000 [▶ 19] | 4 | 250 V _{AC} , 30 V _{DC} | Potential-free make contacts |
| KL2641-0000 [▶ 21] | 1 | 230 V _{AC} | Make contacts, 16 A |

2.1 KL2602-00x0, KL2622-00x0 - Introduction

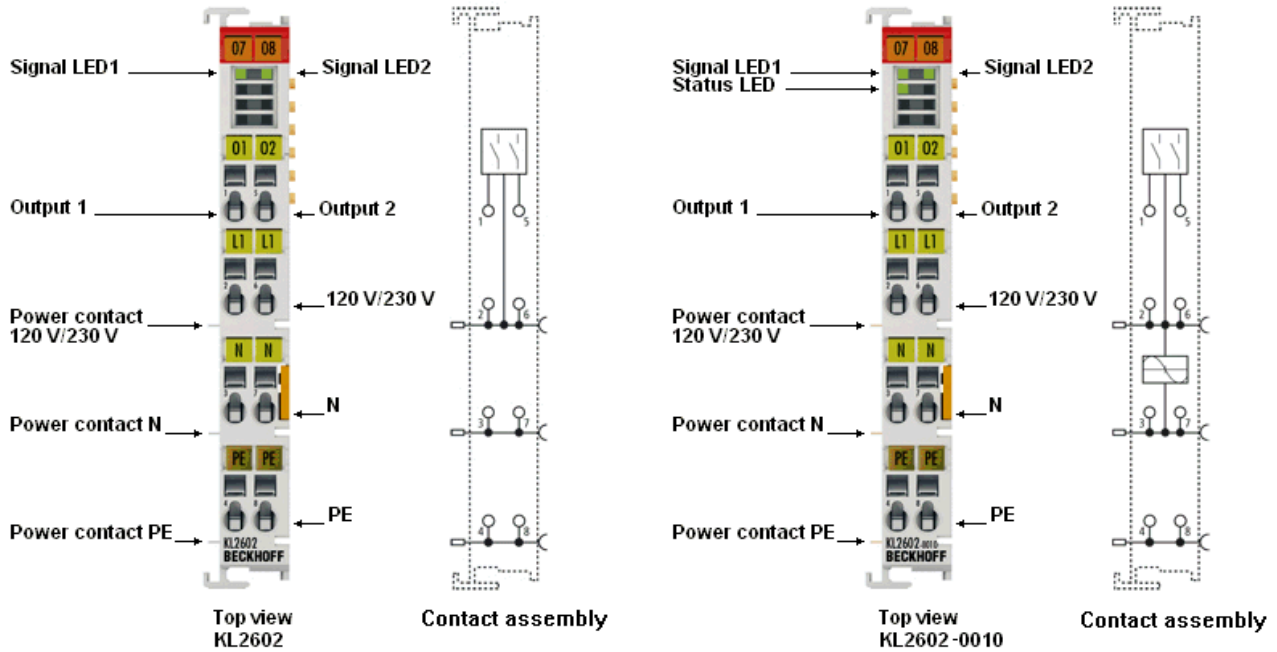


Fig. 2: KL2602-0000, KL2602-0010 – two-channel relay output terminals with power contacts

KL2602-0000 / KS2602-0000

These terminals have two relays, each with a single contact, and can be used to switch mains voltage consumers up to 230 V_{AC}. The relay contacts of the terminals are connected to the power contacts.

KL2602-0010 / KS2602-0010

These terminals have two relays, each with a single contact. These terminals switch at zero voltage crossing to protect the contacts and are especially suitable for capacitive loads such as LED lamps (or rather their control gears).

LEDs

The signal LEDs indicate the operating state of the associated terminal channel.

Watchdog timer overflow

If no process data are transmitted from the bus coupler to the terminal for 100 ms, the green signal LEDs extinguish and the relay contacts are opened after the typical response time (see technical data [▶ 13]).

Process data

The bit width in the process image is 2 bits.

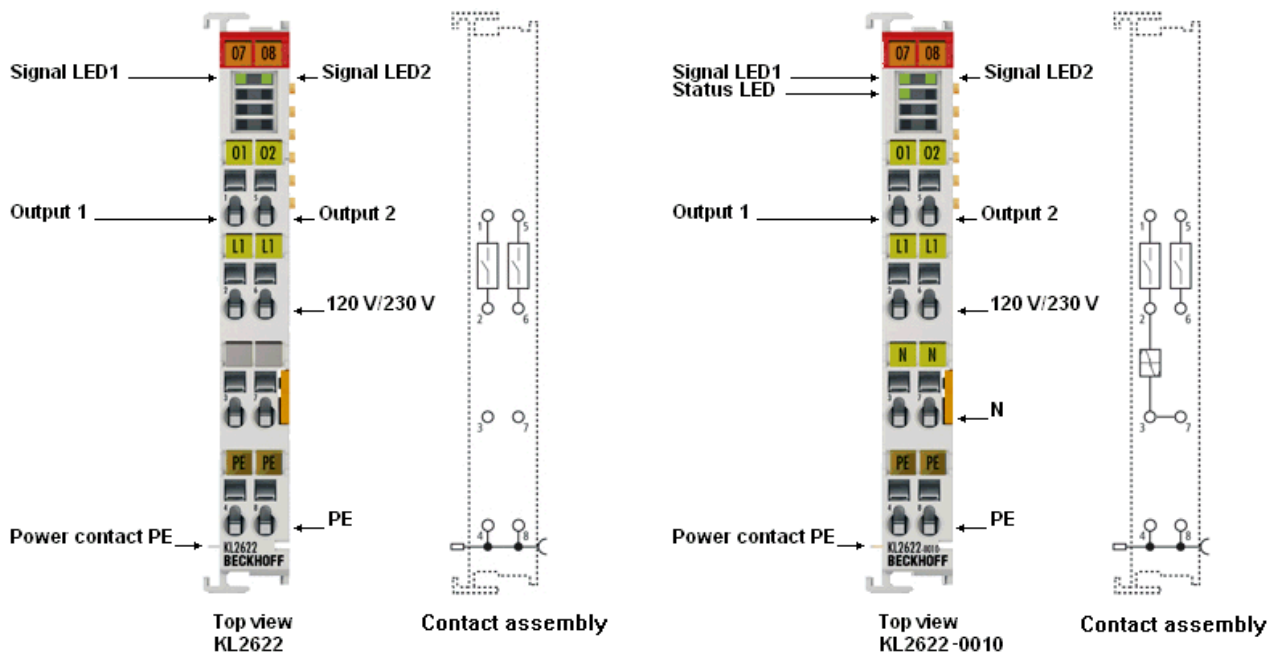


Fig. 3: KL2622-0000, KL2622-0010 – two-channel relay output terminals

KL2622-0000 / KS2622-0000

These terminals have two relays, each with a single contact, and can be used to switch mains voltage consumers up to 230 V_{AC}. The relay contacts of the terminals are potential-free and are not connected to the power contacts.

KL2622-0010 / KS2622-0010

These terminals have two relays, each with a single contact. These terminals switch at zero voltage crossing to protect the contacts and are especially suitable for capacitive loads such as LED lamps (or rather their control gears). The power contacts are not passed through.

LEDs

The signal LEDs indicate the operating state of the associated terminal channel.

Watchdog timer overflow

If no process data are transmitted from the bus coupler to the terminal for 100 ms, the green signal LEDs extinguish and the relay contacts are opened after the typical response time (see technical data [▶ 13]).

Process data

The bit width in the process image is 2 bits.

2.1.1 Technical data

| Technical data | KL2602-0000, KS2602-0000 | KL2622-0000, KS2622-0000 |
|--|--|----------------------------------|
| Number of outputs | 2 make contacts for power contact | 2 make contacts (potential-free) |
| Contact material | AgCdO | |
| Switching voltage | max. 250 V _{AC} / 30 V _{DC} | |
| Switching current | maximum 5 A | |
| Maximum switching capacity with ohmic load | Alternating voltage: 5 A 250 V _{AC} 1250 VA Direct voltage: 5 A 30 V _{DC} 150 W | |
| Max. switching current with inductive load $\cos\phi = 0.4$, L/R = 7 ms | 2 A, 250 V _{AC} 2 A, 30 V _{DC} | |
| Minimum permitted load (guide value) | 10 mA at 5 V _{DC} (in delivery state) 100 mA at 5 V _{DC} (after a current of approx. 100 mA (or higher) has been switched once) | |
| Response times with nominal load | Response time: max. 10 ms Release time: max. 4 ms Bounce time: max. 5 ms | |
| Electrical isolation | 500 V (K-bus / mains voltage) | |
| K-Bus current consumption | 80 mA | 85 mA |
| Bit width in process image | 2 outputs | |
| Service life – mechanical switching cycles | 20,000,000 switching operations | |
| Service life – electrical switching cycles | at least 100,000 switching operations of an ohmic load at 250 V _{AC} , 5 A or 30 V _{DC} , 5 A | |
| Permitted switching frequency at maximum contact load | 10 switching operations / minute | |
| Contact resistance (new) max. | < 30 mΩ | |
| Insulation resistance | 100 MΩ at 500 V _{DC} | |
| Test voltage between open contacts | at least 750 V (1 minute between open contacts) | |
| Configuration | No address or configuration settings | |
| Pluggable wiring | for all KSxxxx terminals | |
| Weight | approx. 85 g | approx. 80 g |
| Dimensions (W x H x D) | approx. 15 mm x 100 mm x 70 mm (width aligned: 12 mm) | |
| Mounting [► 25] | on 35 mm mounting rail according to EN 60715 | |
| Permissible ambient temperature range during operation | -25 °C ... +60 °C | |
| Permissible ambient temperature range during storage | -40 °C ... +85 °C | |
| Relative humidity | 95% no condensation | |
| Vibration / shock resistance | conforms to EN 60068-2-6 / EN 60068-2-27 | |
| EMC immunity / emission | conforms to EN 61000-6-2 / EN 61000-6-4 | |
| Installation position | variable | |
| Protection class | IP20 | |
| Approvals/markings | CE, UKCA, cULus, EAC, GL, ATEX [► 40] | |

Ex marking

| Standard | Marking |
|----------|------------------------|
| ATEX | II 3 G Ex nA IIC T4 Gc |

| Technical data | KL2602-0010, KS2602-0010 | KL2622-0010, KS2622-0010 |
|--|--|--------------------------|
| Number of outputs | 2 make contacts for power contact | 2 make contacts |
| Contact material | Silver alloy (stationary contact gold-plated) | |
| Rated load voltage | 230 V _{AC} /30 V _{DC} | |
| Load type | ohmic, inductive, capacitive | |
| Switching current max. | typ. 5 A _{AC/DC} per channel | |
| Inductive switching current | typ. 2 A _{AC/DC} per channel | |
| Minimum permitted load | typ. 0.1 mA at 0.1 V _{DC} | |
| Electrical isolation | 500 V (K-bus / field voltage) | |
| K-Bus current consumption | 80 mA | 85 mA |
| Bit width in process image | 2 outputs | |
| Response time with nominal load | Max. 20 ms (= 10 ms zero voltage delay at 50 Hz + 10 ms delay time of the relay) | |
| Switching cycles mech. (min.) | 2 x 10 ⁷ (at 18 x 10 ³ switching cycles per hour) | |
| Switching cycles electr. (min.) | 100,000 (3 A at 250 V _{AC} , 3 A at 30 V _{DC} and ohmic load) 80,000 (5 A at 250 V _{AC} , 5 A at 30 V _{DC} and ohmic load) 100,000 (2 A at 250 V _{AC} , 2 A at 30 V _{DC} and inductive load) | |
| Configuration | No address or configuration settings | |
| Special features | switches at the zero voltage crossing to protect the contacts | |
| Contact resistance (max.) | typ. 100 mΩ | |
| Insulation resistance (min.) | typ. 1000 MΩ at 500 V _{DC} | |
| Pluggable wiring | for all KSxxxx terminals | |
| Weight | approx. 50 g | |
| Dimensions (W x H x D) | approx. 15 mm x 100 mm x 70 mm (width aligned: 12 mm) | |
| Mounting [▶ 25] | on 35 mm mounting rail conforms to EN 60715 | |
| Permissible ambient temperature range during operation | 0 °C ... +55 °C | |
| Permissible ambient temperature range during storage | -25 °C ... +85 °C | |
| Relative humidity | 95% no condensation | |
| Vibration / shock resistance | conforms to EN 60068-2-6 / EN 60068-2-27 | |
| EMC immunity / emission | conforms to EN 61000-6-2 / EN 61000-6-4 | |
| Installation position | variable | |
| Protection class | IP20 | |
| Approvals/markings | CE, UKCA, cULus, EAC | |

2.2 KL/KS2612 - Introduction

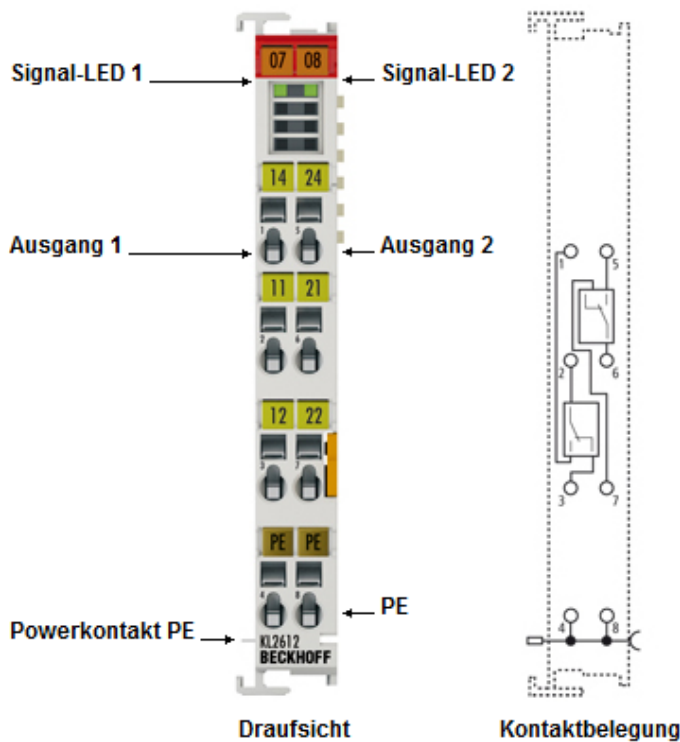


Fig. 4: KL2612 – two-channel relay output terminal with changeover contacts

Controlled by the automation device, the KL/KS2612 relay output terminals switch two relays, each with a single changeover contact. They are equipped with potential-free contacts.

The signal status of the relay is displayed by an LED. If the LED is on, it means that the contact between 2 and 1 or, in the case of the second relay, between 6 and 5, is closed.

The Bus Terminals have no power contacts, which means that a voltage that was forwarded via the power contacts in the case of preceding terminals has to be fed in again after a KL/KS2612.

LEDs

The signal LEDs indicate the operating state of the associated terminal channel.

Watchdog timer overflow

If no process data are transmitted from the bus coupler to the terminal for 100 ms, the green signal LEDs extinguish and the outputs are set to 0.

Process data

The bit width in the process image is 2 bits.

2.2.1 Technical data

| Technical data | KL2612, KS2612 |
|---|---|
| Number of outputs | 2 x change-over |
| Contact material | Gold-plated silver alloy |
| Nominal voltage | 125 V _{AC} / 30 V _{DC} |
| Load type | ohmic |
| Max. output current | 2 A per channel |
| Maximum switching capacity with ohmic load | Alternating voltage: 0.5 A / 125 V _{AC} Direct voltage: 2 A / 30 V _{DC} |
| Minimum permitted load (guide value) | 10 µA at 10 mV |
| Response times with nominal load | Max. response time 4 ms Max. release time 4 ms Max. bounce time 4 ms |
| Lamp load, control gear | Max. input inrush current 2 A |
| Electrical isolation | 500 V (K-bus / field voltage) |
| K-Bus current consumption | 60 mA |
| Bit width in process image | 2 outputs |
| Switching cycles mech. (min.) | 1 x 10 ⁸ switching operations |
| Switching cycles electr. (min.) | 10 ⁵ switching operations, ohmic load at 30 V _{DC} , 2 A or 125 V _{AC} , 0.5 A |
| Permitted switching frequency at maximum contact load | 20 switching operations/min |
| Contact resistance max. (new) | < 40 mOhm |
| Insulation resistance (min.) | 100 MOhm at 500 V _{DC} |
| Test voltage between open contacts | 750 V (1 min. between open contacts) |
| Configuration | no address or configuration settings required |
| Special features | Signal relay |
| Weight | approx. 80 g |
| Dimensions (W x H x D) | 15 mm x 100 mm x 70 mm (width aligned 12 mm) |
| <u>Mounting</u> [► 25] | on 35 mm mounting rail conforms to EN 60715 |
| Permissible ambient temperature during operation | 0 °C ... +55 °C |
| Permissible ambient temperature during storage | -25 °C ... +85 °C |
| Permissible relative humidity | 95 %, no condensation |
| Vibration / shock resistance | conforms to EN 60068-2-6 / EN 60068-2-27 |
| EMC immunity / emission | conforms to EN 61000-6-2 / EN 61000-6-4 |
| Installation position | variable |
| Protection class | IP20 |
| Approvals/markings | CE, UKCA, cULus, EAC, GL, ATEX [► 38] |

Ex marking

| Standard | Marking |
|----------|------------------------|
| ATEX | II 3 G Ex nA IIC T4 Gc |

2.3 KL/KS2631 - Introduction

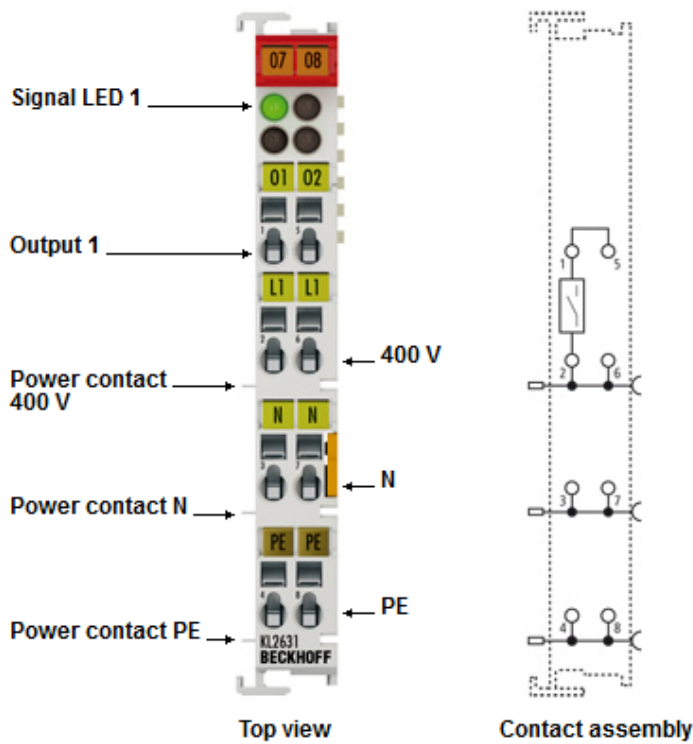


Fig. 5: KL2631 – single-channel relay output terminal 400 V_{AC}, 300 V_{DC}

The KL/KS2631 relay output terminals have a relay with a single contact, which is connected to the power contacts (usable up to 400 V_{AC}) and can be used universally to switch mains voltage consumers. The signal state of the Bus Terminal is indicated by an LED. In order to use the high voltage up to 400 V_{AC}, the terminal must be supplied by the KL9190 power feed terminal.

LEDs

The signal LEDs indicate the operating state of the associated terminal channel.

Watchdog timer overflow

If no process data are transmitted from the bus coupler to the terminal for 100 ms, the green signal LEDs extinguish and the relay contacts are opened after the typical response time.

Process data

The bit width in the process image is 2 bits.

2.3.1 Technical data

| Technical data | KL2631, KS2631 |
|--|---|
| Number of outputs | 1 make contact for power contact |
| Nominal voltage | 400 V _{AC} / 300 V _{DC} |
| DC switching capacity | 300 V = 0.15 A; 24 V = 5 A; non-linear |
| AC switching capacity | 1500 VA |
| Min. switching voltage | Power contact |
| Load type | ohmic, inductive, lamp load |
| Output current | max. 2 A |
| Switching current | DC switching capacity: 300 V = 0.15 A; 24 V = 5 A; non-linear AC switching capacity: 1500 VA |
| Electrical isolation | 500 V (K-bus / field voltage) |
| Current consumption power contacts | load only |
| K-Bus current consumption | 80 mA |
| Bit width in process image | 2 outputs |
| Switching cycles mech. (min.) | 1 x 10 ⁷ |
| Switching cycles electr. (min.) | 1.3 x 10 ⁵ (2 A / 250 V _{AC}) |
| Configuration | no address or configuration settings required |
| Special features | 400 V contact |
| Pluggable wiring | for all KSxxxx terminals |
| Weight | approx. 85 g |
| Dimensions (W x H x D) | 15 mm x 100 mm x 70 mm (width aligned 12 mm) |
| Mounting [▶ 25] | on 35 mm mounting rail conforms to EN 60715 |
| Permissible ambient temperature during operation | 0 °C ... +55 °C |
| Permissible ambient temperature during storage | -25 °C ... +85 °C |
| Permissible relative humidity | 95 %, no condensation |
| Vibration / shock resistance | conforms to EN 60068-2-6 / EN 60068-2-27 |
| EMC immunity / emission | conforms to EN 61000-6-2 / EN 61000-6-4 |
| Installation position | variable |
| Protection class | IP20 |
| Approvals/markings | CE, UKCA, EAC, GL |

2.4 KL2634-0000 - Introduction

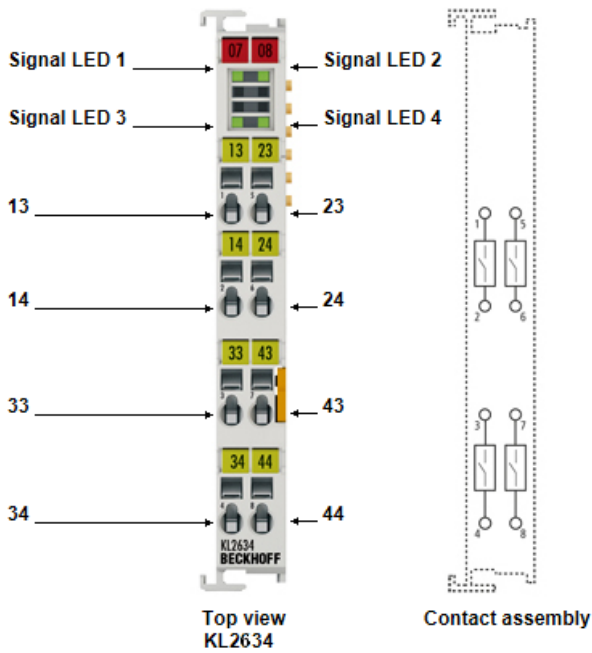


Fig. 6: KL2634 – four-channel relay output terminal

The KL/KS2634 output terminal (4 make contacts) has four relays, each with a single contact. The signal status of the Bus Terminal is displayed by an LED. The terminal is equipped with potential-free contacts; the power contacts L and N are not passed through.

LEDs

The signal LEDs indicate the operating state of the associated terminal channel.

Watchdog timer overflow

If no process data are transmitted from the bus coupler to the terminal for 100 ms, the green signal LEDs extinguish and the relay contacts are opened after the typical response time (see technical data [► 20]).

Process data

The bit width in the process image is 4 bits.

2.4.1 Technical data

| Technical data | KL2634, KS2634 |
|--|---|
| Number of outputs | 4 make contacts (potential-free) |
| Contact material | Silver alloy (stationary contact gold-plated) |
| Rated load voltage | 250 V _{AC} /30 V _{DC} |
| Load type | ohmic, inductive |
| Ohmic switching current | typ. 4 A AC/DC per channel |
| Inductive switching current | typ. 2 A AC/DC per channel |
| Minimum permitted load | typ. 0.1 mA at 0.1 V _{DC} (at 120 operations / min) |
| Electrical isolation | 500 V (K-bus / field voltage) |
| K-Bus current consumption | Typ. 120 mA |
| Bit width in process image | 4 outputs |
| Switching cycles mech. (min.) | 2 x 10 ⁷ (at 18 x 10 ³ switching cycles per hour) |
| Switching cycles electr. (min.) | 1 x 10 ⁵ (3 A at 30 V _{DC} and ohmic load) |
| Configuration | No address or configuration settings |
| Contact resistance (max.) | typ. 100 mΩ |
| Insulation resistance (min.) | typ. 1000 MΩ at 500 V _{DC} |
| Pluggable wiring | for all KSxxxx terminals |
| Weight | approx. 70 g |
| Dimensions (W x H x D) | approx. 15 mm x 100 mm x 70 mm (width aligned: 12 mm) |
| Mounting [▶ 25] | on 35 mm support rail according to EN 60715 |
| Permissible ambient temperature range during operation | 0 °C ... +55 °C |
| Permissible ambient temperature range during storage | -25 °C ... +85 °C |
| Relative humidity | 95% no condensation |
| Vibration / shock resistance | conforms to EN 60068-2-6 / EN 60068-2-27 |
| EMC immunity / emission | conforms to EN 61000-6-2 / EN 61000-6-4 |
| Installation position | variable |
| Protection class | IP20 |
| Approvals/markings | CE, UKCA, EAC |

2.5 KL2641 - Introduction

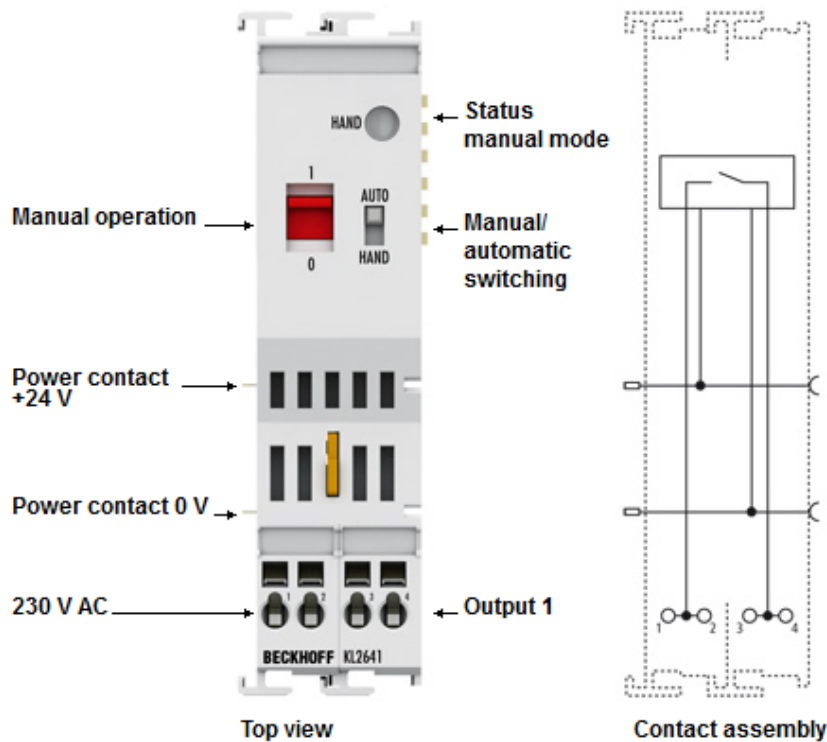


Fig. 7: KL2641 – single-channel relay output terminal, 230 V_{AC}, 16 A, bistable, manual operation

The KL2641 output terminal has a relay with a single contact, which can be used universally for the switching of mains voltage consumers. The relay can optionally be switched in manual or automatic mode. The switch for the manual operation always indicates the switching state of the relay. The operation mode can be set via the manual/automatic switch; the mode is indicated by an LED and transferred to the process image as a status bit. In manual mode, the coil control is interrupted. The relay is actuated by the manual operation switch, which is also usable without a 24 V supply. In automatic mode, the relay is actuated by the controller.

2.5.1 Functional description

Load types

| Load | | 100,000 switching cycles with | 30,000 switching cycles with |
|---|----------------------|-------------------------------|------------------------------|
| Incandescent lamps | | 1.25 kW | 2.5 kW |
| Fluorescent lamps | uncompensated | 1.2 kW | 2.5 kW |
| | parallel compensated | 650 W / 70 µF | 1.3 kW / 140 µF |
| Fluorescent lamps in duo circuit | | 2 x 1.2 kW | 2 x 2.5 kW |
| Halogen lamps (230 V _{AC}) | | 1.2 kW | 2.5 kW |
| Low-voltage halogen lamp with transformer | | 500 VA | 500 VA |
| Mercury vapor/sodium vapor lamps | uncompensated | 1 kW | 2 kW |
| | parallel compensated | 1 kW / 70 µF | 2 kW / 140 µF |
| Dulux lamps | uncompensated | 800 W | 1.6 kW |
| | parallel compensated | 560 W / 70 µF | 1.1 kW / 140 µF |

Operation modes

- **MANUAL:**
The coil control is interrupted. The relay is actuated only with the red manual operation switch
- **AUTO:**
Actuation of the relay via the controller. Manual state changes via the red manual operation switch are reset by the controller after less than 500 ms.

Example

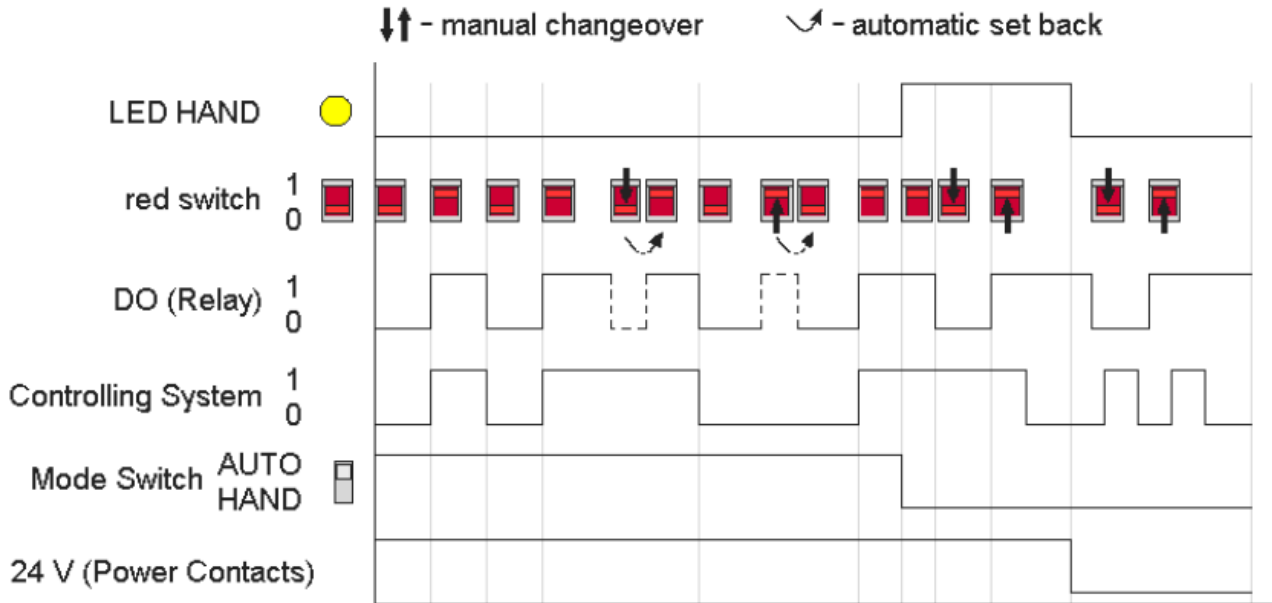


Fig. 8: KL2641

The relay conforms to the international standards according to IEC and EN 61810 Part 1 / VDE 0435 Part 201 as well as the requirements for short-term overcurrents and protection against short-circuit according to IEC and EN 61036 / 61037.

2.5.2 Technical data

| Technical data | KL2641 |
|--|---|
| Number of outputs | 1 make contact, potential-free |
| Nominal voltage | 230 V _{AC} (max. switching voltage 440 V _{AC}) |
| Switching capacity max. | 5 kVA |
| Switching voltage max. | 440 V _{AC} (UL: max. 230 V _{AC}) |
| Load type | ohmic, inductive, lamp load |
| Max. output current | 16 A |
| Switching current | max. 16 A _{AC} |
| Lamp load, control gear | Max. input inrush current 16 A |
| Current consumption power contact | typ. 65 mA + load |
| K-Bus current consumption | typ. 5 mA |
| Contact material | AgSnO ₂ |
| Bit width in process image | Input: 2 (Status Hand, Auto), Output: 2 |
| Switching cycles | 10 ⁶ |
| Configuration | no address or configuration settings required |
| Special features | Manual operation; bistable relay contact |
| Weight | approx. 110 g |
| Dimensions (W x H x D) | 27 mm x 100 mm x 68 mm (width aligned 24 mm) |
| Mounting [▶ 25] | on 35 mm mounting rail conforms to EN 60715 |
| Permissible ambient temperature range during operation | 0 °C ... +55 °C |
| Permissible ambient temperature range during storage | -25 °C ... +85 °C |
| Permissible relative humidity | 95 %, no condensation |
| Vibration / shock resistance | conforms to EN 60068-2-6 / EN 60068-2-27 |
| EMC immunity / emission | conforms to EN 61000-6-2 / EN 61000-6-4 |
| Installation position | variable |
| Protection class | IP20 |
| Approvals/markings | CE, UKCA, EAC |

3 Mounting and wiring

3.1 Instructions for ESD protection

NOTE

Destruction of the devices by electrostatic discharge possible!

The devices contain components at risk from electrostatic discharge caused by improper handling.

- Please ensure you are electrostatically discharged and avoid touching the contacts of the device directly.
- Avoid contact with highly insulating materials (synthetic fibers, plastic film etc.).
- Surroundings (working place, packaging and personnel) should be grounded probably, when handling with the devices.
- Each assembly must be terminated at the right hand end with a KL9010 bus end terminal, to ensure the protection class and ESD protection.

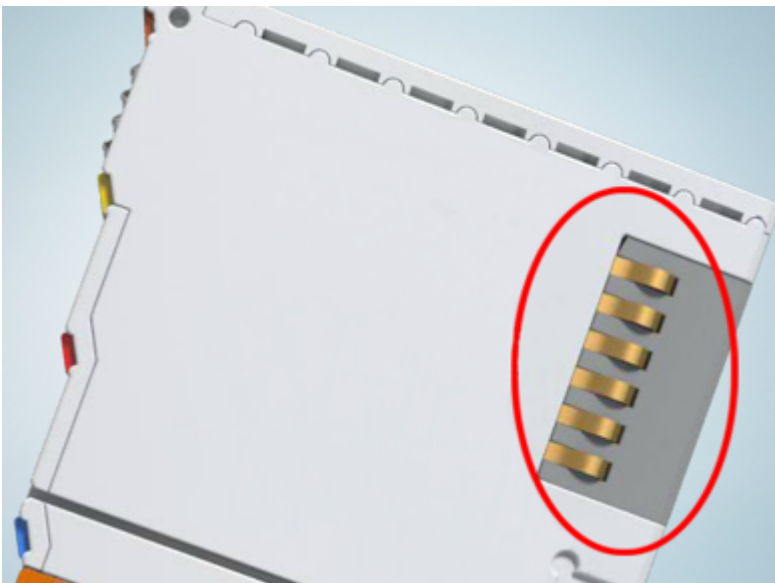


Fig. 9: Spring contacts of the Beckhoff I/O components

3.2 Installation on mounting rails

⚠ WARNING

Risk of electric shock and damage of device!

Bring the bus terminal system into a safe, powered down state before starting installation, disassembly or wiring of the bus terminals!

Assembly

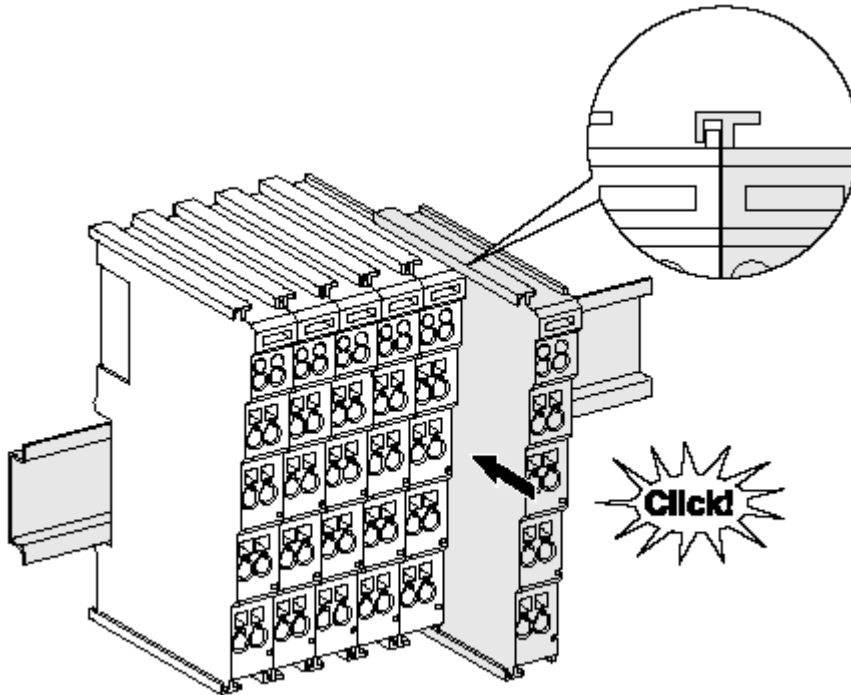


Fig. 10: Attaching on mounting rail

The bus coupler and bus terminals are attached to commercially available 35 mm mounting rails (DIN rails according to EN 60715) by applying slight pressure:

1. First attach the fieldbus coupler to the mounting rail.
2. The bus terminals are now attached on the right-hand side of the fieldbus coupler. Join the components with tongue and groove and push the terminals against the mounting rail, until the lock clicks onto the mounting rail.

If the terminals are clipped onto the mounting rail first and then pushed together without tongue and groove, the connection will not be operational! When correctly assembled, no significant gap should be visible between the housings.

i Fixing of mounting rails

The locking mechanism of the terminals and couplers extends to the profile of the mounting rail. At the installation, the locking mechanism of the components must not come into conflict with the fixing bolts of the mounting rail. To mount the mounting rails with a height of 7.5 mm under the terminals and couplers, you should use flat mounting connections (e.g. countersunk screws or blind rivets).

Disassembly

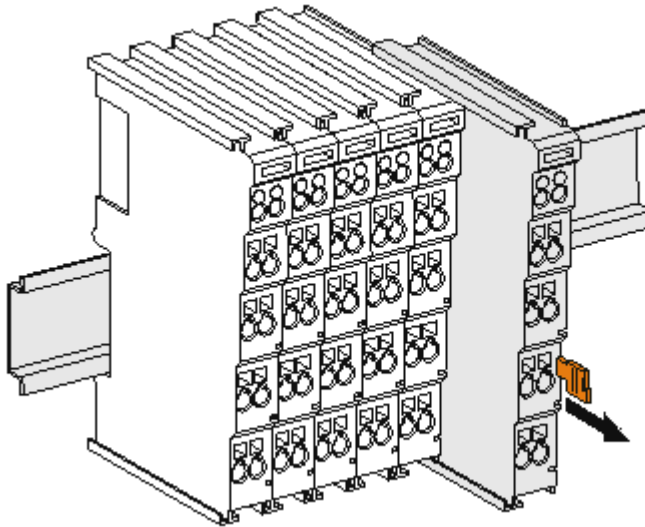


Fig. 11: Disassembling of terminal

Each terminal is secured by a lock on the mounting rail, which must be released for disassembly:

1. Pull the terminal by its orange-colored lugs approximately 1 cm away from the mounting rail. In doing so for this terminal the mounting rail lock is released automatically and you can pull the terminal out of the bus terminal block easily without excessive force.
2. Grasp the released terminal with thumb and index finger simultaneous at the upper and lower grooved housing surfaces and pull the terminal out of the bus terminal block.

Connections within a bus terminal block

The electric connections between the Bus Coupler and the Bus Terminals are automatically realized by joining the components:

- The six spring contacts of the K-Bus/E-Bus deal with the transfer of the data and the supply of the Bus Terminal electronics.
- The power contacts deal with the supply for the field electronics and thus represent a supply rail within the bus terminal block. The power contacts are supplied via terminals on the Bus Coupler (up to 24 V) or for higher voltages via power feed terminals.

i Power Contacts

During the design of a bus terminal block, the pin assignment of the individual Bus Terminals must be taken account of, since some types (e.g. analog Bus Terminals or digital 4-channel Bus Terminals) do not or not fully loop through the power contacts. Power Feed Terminals (KL91xx, KL92xx or EL91xx, EL92xx) interrupt the power contacts and thus represent the start of a new supply rail.

PE power contact

The power contact labeled PE can be used as a protective earth. For safety reasons this contact mates first when plugging together, and can ground short-circuit currents of up to 125 A.

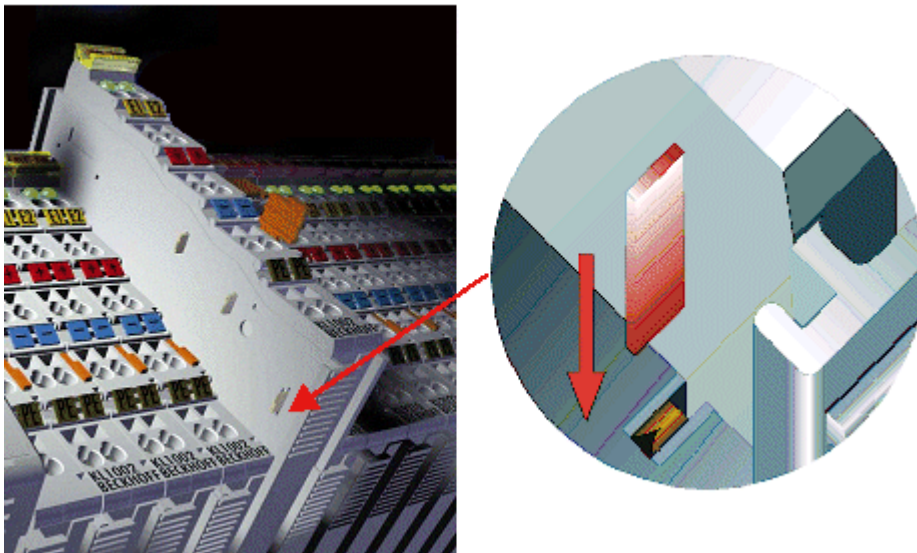


Fig. 12: Power contact on left side

NOTE

Possible damage of the device

Note that, for reasons of electromagnetic compatibility, the PE contacts are capacitatively coupled to the mounting rail. This may lead to incorrect results during insulation testing or to damage on the terminal (e.g. disruptive discharge to the PE line during insulation testing of a consumer with a nominal voltage of 230 V). For insulation testing, disconnect the PE supply line at the Bus Coupler or the Power Feed Terminal! In order to decouple further feed points for testing, these Power Feed Terminals can be released and pulled at least 10 mm from the group of terminals.

⚠ WARNING

Risk of electric shock!

The PE power contact must not be used for other potentials!

3.3 Connection

3.3.1 Connection system

⚠ WARNING

Risk of electric shock and damage of device!

Bring the bus terminal system into a safe, powered down state before starting installation, disassembly or wiring of the bus terminals!

Overview

The bus terminal system offers different connection options for optimum adaptation to the respective application:

- The terminals of ELxxxx and KLxxxx series with standard wiring include electronics and connection level in a single enclosure.
- The terminals of ESxxxx and KSxxxx series feature a pluggable connection level and enable steady wiring while replacing.
- The High Density Terminals (HD Terminals) include electronics and connection level in a single enclosure and have advanced packaging density.

Standard wiring (ELxxxx / KLxxxx)



Fig. 13: Standard wiring

The terminals of ELxxxx and KLxxxx series have been tried and tested for years. They feature integrated screwless spring force technology for fast and simple assembly.

Pluggable wiring (ESxxxx / KSxxxx)



Fig. 14: Pluggable wiring

The terminals of ESxxxx and KSxxxx series feature a pluggable connection level. The assembly and wiring procedure is the same as for the ELxxxx and KLxxxx series. The pluggable connection level enables the complete wiring to be removed as a plug connector from the top of the housing for servicing. The lower section can be removed from the terminal block by pulling the unlocking tab. Insert the new component and plug in the connector with the wiring. This reduces the installation time and eliminates the risk of wires being mixed up.

The familiar dimensions of the terminal only had to be changed slightly. The new connector adds about 3 mm. The maximum height of the terminal remains unchanged.

A tab for strain relief of the cable simplifies assembly in many applications and prevents tangling of individual connection wires when the connector is removed.

Conductor cross sections between 0.08 mm² and 2.5 mm² can continue to be used with the proven spring force technology.

The overview and nomenclature of the product names for ESxxxx and KSxxxx series has been retained as known from ELxxxx and KLxxxx series.

High Density Terminals (HD Terminals)



Fig. 15: High Density Terminals

The terminals from these series with 16 terminal points are distinguished by a particularly compact design, as the packaging density is twice as large as that of the standard 12 mm bus terminals. Massive conductors and conductors with a wire end sleeve can be inserted directly into the spring loaded terminal point without tools.

● Wiring HD Terminals



The High Density Terminals of the ELx8xx and KLx8xx series doesn't support pluggable wiring.

Ultrasonically “bonded” (ultrasonically welded) conductors

● Ultrasonically “bonded” conductors



It is also possible to connect the Standard and High Density Terminals with ultrasonically “bonded” (ultrasonically welded) conductors. In this case, please note the tables concerning the wire-size width!

3.3.2 Wiring

⚠ WARNING

Risk of electric shock and damage of device!

Bring the bus terminal system into a safe, powered down state before starting installation, disassembly or wiring of the bus terminals!

Terminals for standard wiring ELxxxx/KLxxxx and for pluggable wiring ESxxxx/KSxxxx

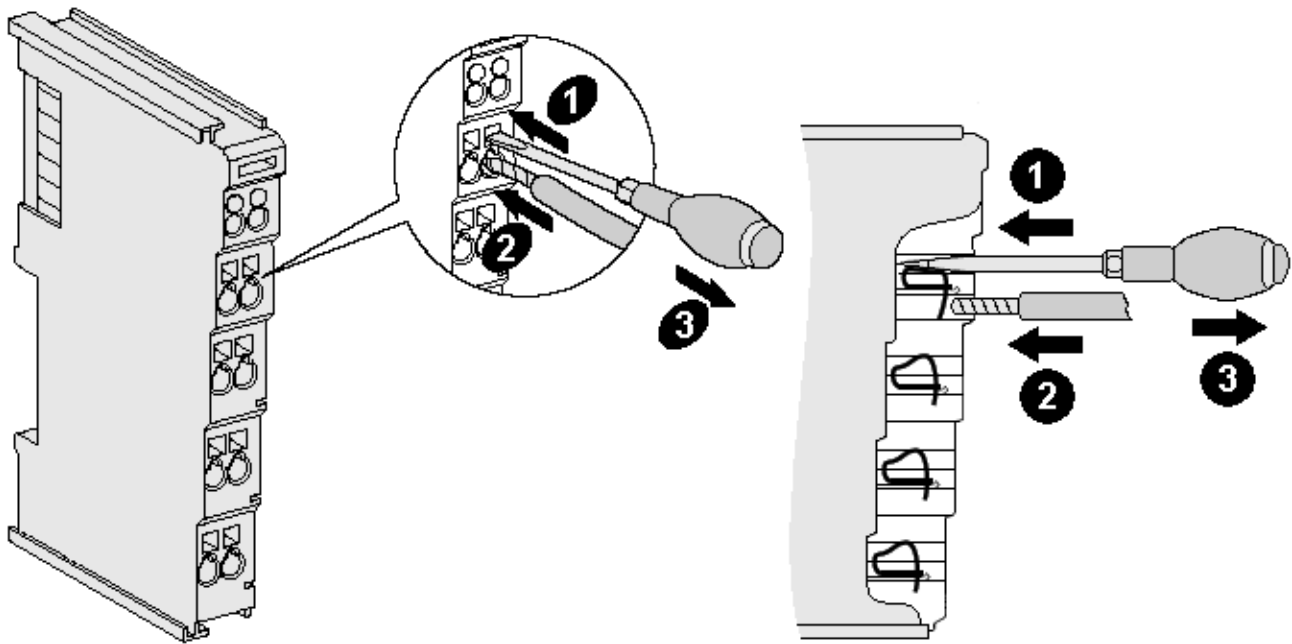


Fig. 16: Connecting a cable on a terminal point

Up to eight terminal points enable the connection of solid or finely stranded cables to the bus terminal. The terminal points are implemented in spring force technology. Connect the cables as follows:

1. Open a terminal point by pushing a screwdriver straight against the stop into the square opening above the terminal point. Do not turn the screwdriver or move it alternately (don't toggle).
2. The wire can now be inserted into the round terminal opening without any force.
3. The terminal point closes automatically when the pressure is released, holding the wire securely and permanently.

See the following table for the suitable wire size width.

| Terminal housing | ELxxxx, KLxxxx | ESxxxx, KSxxxx |
|---|------------------------------|------------------------------|
| Wire size width (single core wires) | 0.08 ... 2.5 mm ² | 0.08 ... 2.5 mm ² |
| Wire size width (fine-wire conductors) | 0.08 ... 2.5 mm ² | 0,08 ... 2.5 mm ² |
| Wire size width (conductors with a wire end sleeve) | 0.14 ... 1.5 mm ² | 0.14 ... 1.5 mm ² |
| Wire stripping length | 8 ... 9 mm | 9 ... 10 mm |

High Density Terminals (HD Terminals [▶ 29]) with 16 terminal points

The conductors of the HD Terminals are connected without tools for single-wire conductors using the direct plug-in technique, i.e. after stripping the wire is simply plugged into the terminal point. The cables are released, as usual, using the contact release with the aid of a screwdriver. See the following table for the suitable wire size width.

| Terminal housing | High Density Housing |
|--|-------------------------------|
| Wire size width (single core wires) | 0.08 ... 1.5 mm ² |
| Wire size width (fine-wire conductors) | 0.25 ... 1.5 mm ² |
| Wire size width (conductors with a wire end sleeve) | 0.14 ... 0.75 mm ² |
| Wire size width (ultrasonically "bonded" conductors) | only 1.5 mm ² |
| Wire stripping length | 8 ... 9 mm |

3.3.3 KL/KS2602 – connection and LEDs

⚠ WARNING

Risk of injury through electric shock and damage to the device!
 Bring the Bus Terminal system into a safe, de-energized state before starting mounting, disassembly or wiring of the Bus Terminals!

NOTE

Risk of device damage!
 Note that the use of potential separation terminals (e.g., KL9080) is necessary when planning the Bus Terminal system with different potentials on the power contacts (e.g., 24 V_{DC} and 230 V_{AC})!

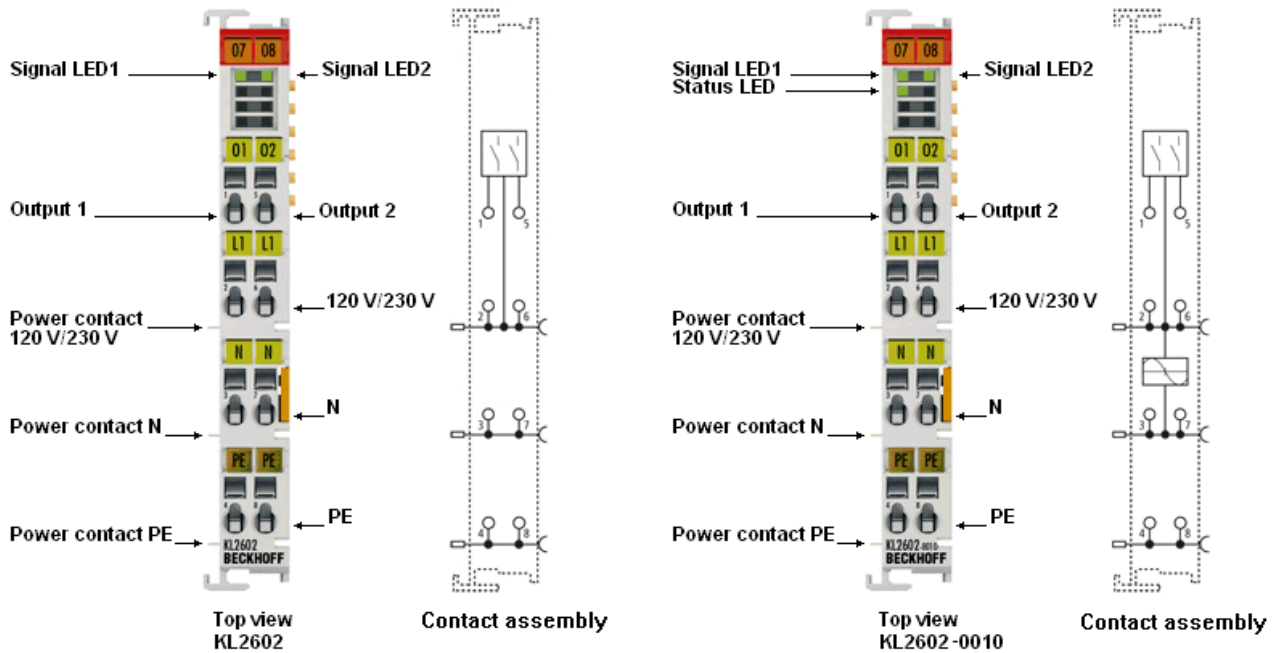


Fig. 17: KL2602-0000, KL2602-0010 – connection and LEDs

KL/KS2602-0000, KL/KS2602-0010 - connection

| Terminal point | | Description |
|----------------|-----|--|
| Name | No. | |
| 01 | 1 | Output 1 (relay) |
| L1 | 2 | 120 / 230 V _{AC} (internally connected to terminal point 6 and power contact L) |
| N | 3 | Neutral conductor (internally connected to terminal point 7 and power contact N) |
| PE | 4 | PE (internally connected to terminal point 8 and power contact PE) |
| 02 | 5 | Output 2 (relay) |
| L1 | 6 | 120 / 230 V _{AC} (internally connected to terminal point 2 and power contact L) |
| N | 7 | Neutral conductor (internally connected to terminal point 3 and power contact N) |
| PE | 8 | PE (internally connected to terminal point 4 and power contact PE) |

KL/KS2602-0000, KL/KS2602-0010 – LED displays

| LED | Color | State | Meaning |
|---------------------------|-------|-------|--|
| Signal 1, Signal 2 | green | off | No output voltage at Output 1 or Output 2 |
| | | on | Output voltage (≤ 230 V _{AC} or ≤ 30 V _{DC}) at Output 1 or Output 2 |
| Status (KL2602-0010 only) | green | off | Terminal is not synchronized (relay switches without delay e.g., with DC supply) |
| | | on | Terminal is synchronized to mains frequency |

3.3.4 KL/KS2622 – connection and LEDs

⚠ WARNING

Risk of injury through electric shock and damage to the device!

Bring the Bus Terminal system into a safe, de-energized state before starting mounting, disassembly or wiring of the Bus Terminals!

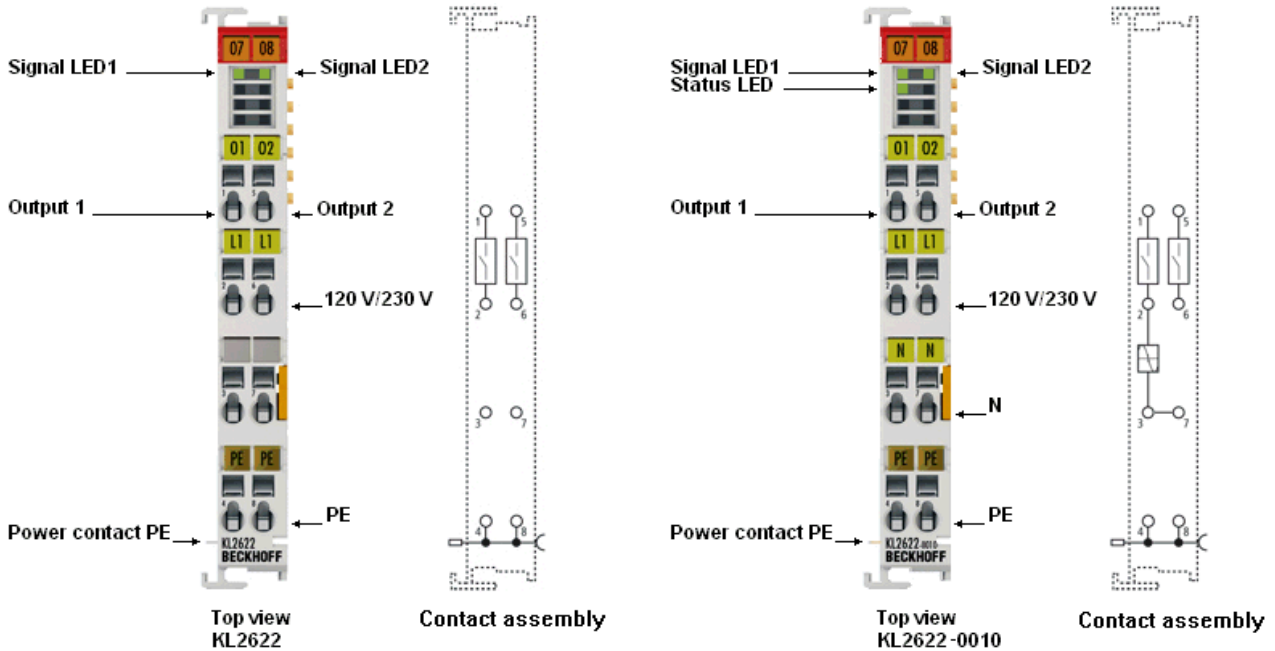


Fig. 18: KL2622-0000, KL2622-0010 – connection and LEDs

KL/KS2622-0000 - Connection

| Terminal point | | Description |
|----------------|-----|--|
| Name | No. | |
| 01 | 1 | Output 1 (relay) |
| L1 | 2 | 120 / 230 V _{AC} |
| - | 3 | not connected |
| PE | 4 | PE (internally connected to terminal point 8 and power contact PE) |
| 02 | 5 | Output 2 (relay) |
| L1 | 6 | 120 / 230 V _{AC} |
| - | 7 | not connected |
| PE | 8 | PE (internally connected to terminal point 4 and power contact PE) |

KL/KS2622-0010 - Connection

| Terminal point | | Description |
|----------------|-----|--|
| Name | No. | |
| 01 | 1 | Output 1 (relay) |
| L1 | 2 | 120 / 230 V _{AC} |
| N | 3 | Neutral conductor (internally connected to terminal point 7) |
| PE | 4 | PE (internally connected to terminal point 8 and power contact PE) |
| 02 | 5 | Output 2 (relay) |
| L1 | 6 | 120 / 230 V _{AC} |
| N | 7 | Neutral conductor (internally connected to terminal point 3) |
| PE | 8 | PE (internally connected to terminal point 4 and power contact PE) |

KL/KS2622-0000, KL/KS2622-0010 – LED displays

| LED | Color | State | Meaning |
|------------------------------|-------|-------|--|
| Signal1, Signal2 | green | off | Contacts 1-2 (channel 1) or 5-6 (channel 2) not connected, i.e. no output voltage at Output 1 or Output 2 |
| | | on | Contacts 1-2 (channel 1) or 5-6 (channel 2) connected, i.e. output voltage ($\leq 230 V_{AC}$ or $\leq 30 V_{DC}$) at Output 1 or Output 2 |
| Status (KL2622-0010 only) | green | off | Terminal is not synchronized (relay switches without delay e.g., with DC supply) |
| | | on | Terminal is synchronized to mains frequency |

3.3.5 KL/KS2612 – connection and LEDs

⚠ WARNING

Risk of injury through electric shock and damage to the device!

Bring the Bus Terminal system into a safe, de-energized state before starting mounting, disassembly or wiring of the Bus Terminals!

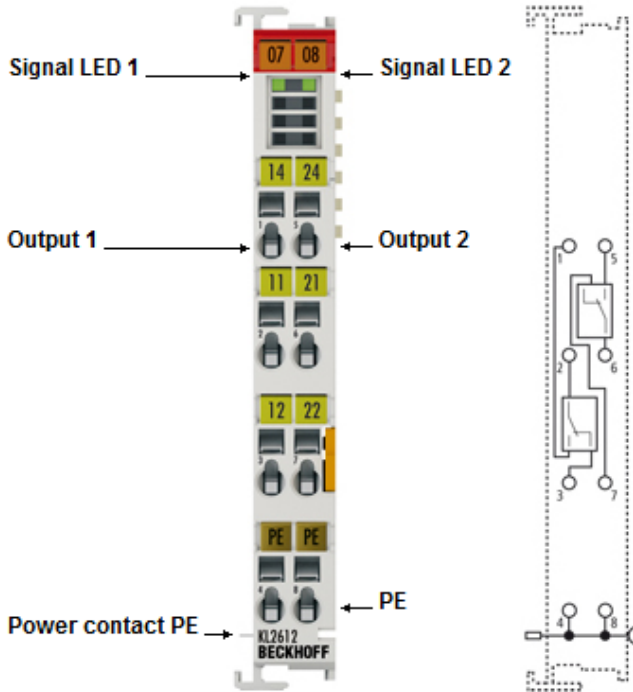


Fig. 19: KL2612-0000 – connection and LEDs

KL/KS2612-0000 - Connection

| Terminal point | | Description |
|----------------|-----|--|
| Name | No. | |
| Output 1 | 1 | Relay 1: Make contact |
| | 2 | Relay 1: Middle contact |
| | 3 | Relay 1: Break contact |
| PE | 4 | PE (internally connected to terminal point 8 and power contact PE) |
| Output 2 | 5 | Relay 2: Make contact |
| | 6 | Relay 2: Middle contact |
| | 7 | Relay 2: Break contact |
| PE | 8 | PE (internally connected to terminal point 4 and power contact PE) |

KL/KS2612-0000 – LED displays

| LED | Color | State | Meaning |
|----------------|-------|-------|--|
| Signal LED 1-2 | green | off | Changeover between terminal points 2-3 (channel 1) or 6-7 (channel 2) closed |
| | | on | Changeover between terminal points 2-1 (channel 1) or 6-5 (channel 2) closed |

3.3.6 KL/KS2631 – connection and LEDs

⚠ WARNING

Risk of injury through electric shock and damage to the device!
 Bring the Bus Terminal system into a safe, de-energized state before starting mounting, disassembly or wiring of the Bus Terminals!

NOTE

Risk of device damage!
 Note that the use of potential separation terminals (e.g., KL9080) is necessary when planning the Bus Terminal system with different potentials on the power contacts (e.g., 24 V_{DC} and 230 V_{AC})!

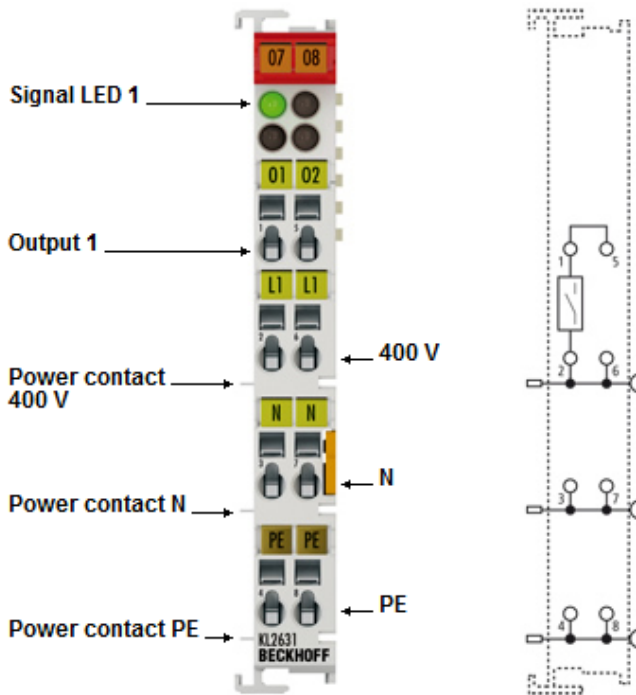


Fig. 20: KL2631-0000 – connection and LEDs

KL/KS2631-0000 - connection

| Terminal point | | Description |
|----------------|-----|--|
| Name | No. | |
| Output 1 | 1 | Output 1 (internally connected to terminal point 5) |
| 400 V | 2 | 400 V (internally connected to terminal point 6 and power contact 400 V) |
| N | 3 | N (internally connected to terminal point 7 and power contact N) |
| PE | 4 | PE (internally connected to terminal point 8 and power contact PE) |
| Output 1 | 5 | Output 1 (internally connected to terminal point 1) |
| 400 V | 6 | 400 V (internally connected to terminal point 2 and power contact 400 V) |
| N | 7 | N (internally connected to terminal point 3 and power contact N) |
| PE | 8 | PE (internally connected to terminal point 4 and power contact PE) |

KL/KS2631-0000 – LED displays

| LED | Color | State | Meaning |
|--------------|-------|-------|--------------------|
| Signal LED 1 | green | off | Signal voltage "0" |
| | | on | Signal voltage "1" |

3.3.7 KL/KS2634 – connection and LEDs

⚠ WARNING

Risk of injury through electric shock and damage to the device!
 Bring the Bus Terminal system into a safe, de-energized state before starting mounting, disassembly or wiring of the Bus Terminals!

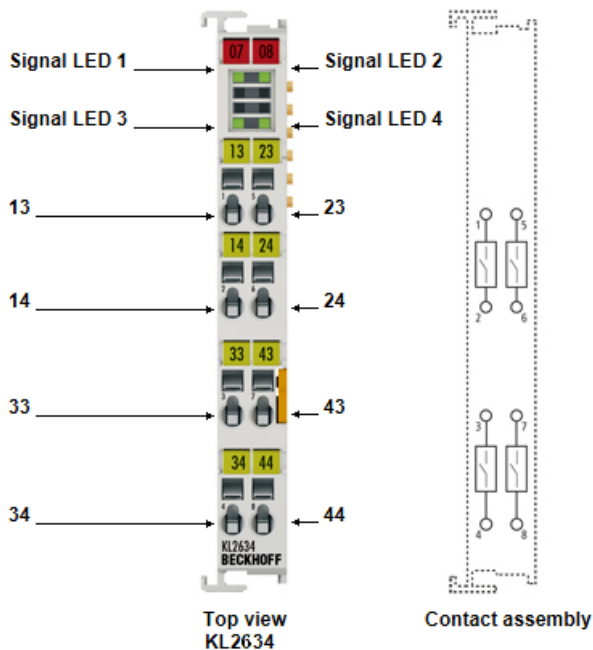


Fig. 21: KL2634-0000 – connection and LEDs

KL/KS2634-0000 - connection

| Terminal point | | Description |
|----------------|-----|-----------------------|
| Name | No. | |
| 13 | 1 | Relay 1, make contact |
| 14 | 2 | |
| 33 | 3 | Relay 3, make contact |
| 34 | 4 | |
| 23 | 5 | Relay 2, make contact |
| 24 | 6 | |
| 43 | 7 | Relay 4, make contact |
| 44 | 8 | |

KL/KS2634-0000 – LED displays

| LED | Color | State | Meaning |
|-------------------------|-------|-------|--|
| Signal 1... Signal 4 | green | off | Terminal points 1-2 (channel 1), 5-6 (channel 2), 3-4 (channel 3) or 7-8 (channel 4) not connected |
| | | on | Terminal points 1-2 (channel 1), 5-6 (channel 2), 3-4 (channel 3) or 7-8 (channel 4) connected |

3.3.8 KL2641-0000 – connection and LEDs

⚠ WARNING

Risk of injury through electric shock and damage to the device!
 Bring the Bus Terminal system into a safe, de-energized state before starting mounting, disassembly or wiring of the Bus Terminals!

NOTE

Risk of device damage!
 Note that the use of potential separation terminals (e.g., KL9080) is necessary when planning the Bus Terminal system with different potentials on the power contacts (e.g., 24 V_{DC} and 230 V_{AC})!

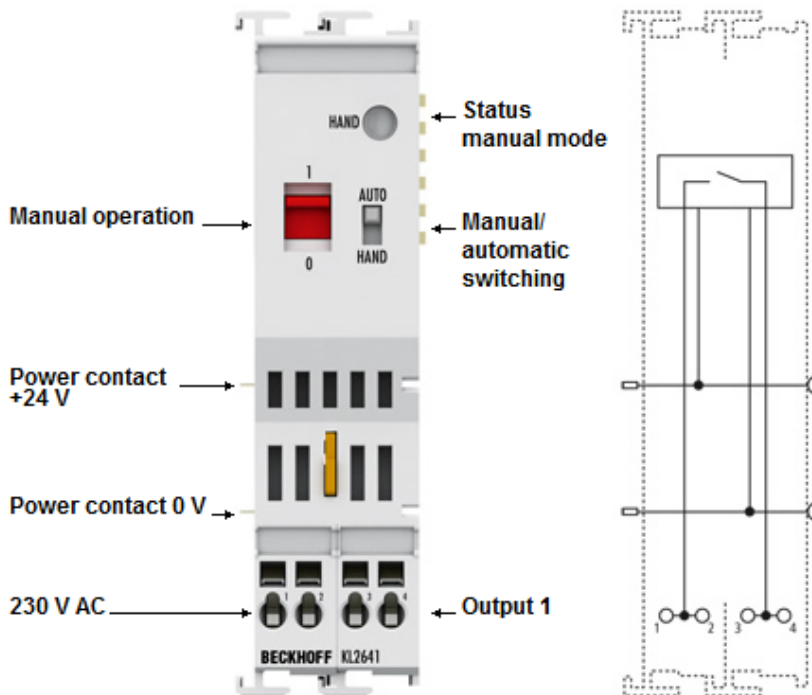


Fig. 22: KL2641-0000 – connection and LEDs

KL2641-0000 – connection

| Terminal point | | Description |
|-------------------------|-----|--|
| Name | No. | |
| Output 1 (DO) | 1 | Output 1, load (internally connected to terminal point 2) |
| Output 1 (DO) | 2 | Output 1, load (internally connected to terminal point 1) |
| 230 V _{AC} (L) | 3 | Mains voltage 230 V _{AC} (internally connected to terminal point 4) |
| 230 V _{AC} (L) | 4 | Mains voltage 230 V _{AC} (internally connected to terminal point 3) |

KL2641-0000 – LED displays

| LED | Color | State | Meaning |
|-------------------|-------|-------|------------------------------|
| Signal LED MANUAL | green | off | Operation via the controller |
| | | on | Manual operation |

3.4 ATEX - Special conditions (standard temperature range)

⚠ WARNING

Observe the special conditions for the intended use of Beckhoff fieldbus components with standard temperature range in potentially explosive areas (directive 2014/34/EU)!

- The certified components are to be installed in a suitable housing that guarantees a protection class of at least IP54 in accordance with EN 60079-15! The environmental conditions during use are thereby to be taken into account!
- For dust (only the fieldbus components of certificate no. KEMA 10ATEX0075 X Issue 9): The equipment shall be installed in a suitable enclosure providing a degree of protection of IP54 according to EN 60079-31 for group IIIA or IIIB and IP6X for group IIIC, taking into account the environmental conditions under which the equipment is used!
- If the temperatures during rated operation are higher than 70°C at the feed-in points of cables, lines or pipes, or higher than 80°C at the wire branching points, then cables must be selected whose temperature data correspond to the actual measured temperature values!
- Observe the permissible ambient temperature range of 0 to 55°C for the use of Beckhoff fieldbus components standard temperature range in potentially explosive areas!
- Measures must be taken to protect against the rated operating voltage being exceeded by more than 40% due to short-term interference voltages!
- The individual terminals may only be unplugged or removed from the Bus Terminal system if the supply voltage has been switched off or if a non-explosive atmosphere is ensured!
- The connections of the certified components may only be connected or disconnected if the supply voltage has been switched off or if a non-explosive atmosphere is ensured!
- The fuses of the KL92xx/EL92xx power feed terminals may only be exchanged if the supply voltage has been switched off or if a non-explosive atmosphere is ensured!
- Address selectors and ID switches may only be adjusted if the supply voltage has been switched off or if a non-explosive atmosphere is ensured!

Standards

The fundamental health and safety requirements are fulfilled by compliance with the following standards:

- EN 60079-0:2012+A11:2013
- EN 60079-15:2010
- EN 60079-31:2013 (only for certificate no. KEMA 10ATEX0075 X Issue 9)

Marking

The Beckhoff fieldbus components with standard temperature range certified according to the ATEX directive for potentially explosive areas bear one of the following markings:



II 3G KEMA 10ATEX0075 X Ex nA IIC T4 Gc Ta: 0 ... +55°C

II 3D KEMA 10ATEX0075 X Ex tc IIIC T135°C Dc Ta: 0 ... +55°C
(only for fieldbus components of certificate no. KEMA 10ATEX0075 X Issue 9)

or



II 3G KEMA 10ATEX0075 X Ex nA nC IIC T4 Gc Ta: 0 ... +55°C

II 3D KEMA 10ATEX0075 X Ex tc IIIC T135°C Dc Ta: 0 ... +55°C
(only for fieldbus components of certificate no. KEMA 10ATEX0075 X Issue 9)

3.5 ATEX - Special conditions (extended temperature range)

⚠ WARNING

Observe the special conditions for the intended use of Beckhoff fieldbus components with extended temperature range (ET) in potentially explosive areas (directive 2014/34/EU)!

- The certified components are to be installed in a suitable housing that guarantees a protection class of at least IP54 in accordance with EN 60079-15! The environmental conditions during use are thereby to be taken into account!
- For dust (only the fieldbus components of certificate no. KEMA 10ATEX0075 X Issue 9): The equipment shall be installed in a suitable enclosure providing a degree of protection of IP54 according to EN 60079-31 for group IIIA or IIIB and IP6X for group IIIC, taking into account the environmental conditions under which the equipment is used!
- If the temperatures during rated operation are higher than 70°C at the feed-in points of cables, lines or pipes, or higher than 80°C at the wire branching points, then cables must be selected whose temperature data correspond to the actual measured temperature values!
- Observe the permissible ambient temperature range of -25 to 60°C for the use of Beckhoff fieldbus components with extended temperature range (ET) in potentially explosive areas!
- Measures must be taken to protect against the rated operating voltage being exceeded by more than 40% due to short-term interference voltages!
- The individual terminals may only be unplugged or removed from the Bus Terminal system if the supply voltage has been switched off or if a non-explosive atmosphere is ensured!
- The connections of the certified components may only be connected or disconnected if the supply voltage has been switched off or if a non-explosive atmosphere is ensured!
- The fuses of the KL92xx/EL92xx power feed terminals may only be exchanged if the supply voltage has been switched off or if a non-explosive atmosphere is ensured!
- Address selectors and ID switches may only be adjusted if the supply voltage has been switched off or if a non-explosive atmosphere is ensured!

Standards

The fundamental health and safety requirements are fulfilled by compliance with the following standards:

- EN 60079-0:2012+A11:2013
- EN 60079-15:2010
- EN 60079-31:2013 (only for certificate no. KEMA 10ATEX0075 X Issue 9)

Marking

The Beckhoff fieldbus components with extended temperature range (ET) certified according to the ATEX directive for potentially explosive areas bear the following marking:



II 3G KEMA 10ATEX0075 X Ex nA IIC T4 Gc Ta: -25 ... +60°C

II 3D KEMA 10ATEX0075 X Ex tc IIIC T135°C Dc Ta: -25 ... +60°C
(only for fieldbus components of certificate no. KEMA 10ATEX0075 X Issue 9)

or



II 3G KEMA 10ATEX0075 X Ex nA nC IIC T4 Gc Ta: -25 ... +60°C

II 3D KEMA 10ATEX0075 X Ex tc IIIC T135°C Dc Ta: -25 ... +60°C
(only for fieldbus components of certificate no. KEMA 10ATEX0075 X Issue 9)

3.6 Continulative documentation for ATEX and IECEx



Continulative documentation about explosion protection according to ATEX and IECEx

Pay also attention to the continuative documentation

Ex. Protection for Terminal Systems

Notes on the use of the Beckhoff terminal systems in hazardous areas according to ATEX and IECEx

that is available for [download](#) on the Beckhoff homepage www.beckhoff.com!

3.7 Disposal



Products marked with a crossed-out wheeled bin shall not be discarded with the normal waste stream. The device is considered as waste electrical and electronic equipment. The national regulations for the disposal of waste electrical and electronic equipment must be observed.

4 Commissioning

4.1 Use of the relay terminals

NOTE

Smooth operation

It is extremely important to observe the technical specifications if fault-free operation of the relay terminal is to be guaranteed. Every exceedance of the factors specified in the technical data can lead to premature contact ageing or even welding.

If relays are to be used in a control system the expected operating conditions must be analyzed with great care.

- Switching capacity, service life (switching cycles) and the number of switches per minute must be considered.
- Appropriate protective circuits must be used to protect the relay contacts from excessive voltage peaks such as can occur when switching inductive loads (contactors, motors etc.). This allows switching frequencies nearly equal to those appropriate to ohmic loads to be achieved.
- Arcing time when switching DC loads are significantly longer than those for comparable AC voltages (zero crossing); material flow can result.
- If the terminal is used to change the direction of inductive loads, adequate dead-times during the switch-over must be provided, in order to avoid temporary short-circuits.

4.1.1 KL2612 – service life

⚠ CAUTION

Observe the maximum values!

It is the maximum values that are to be expected that are critical to selection of the right terminal rather than the technical figures for normal operation!

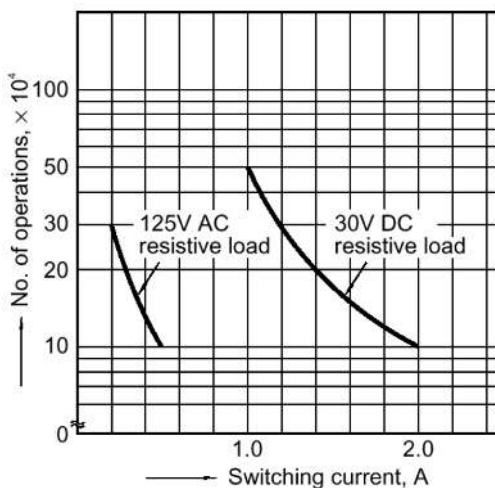


Fig. 23: KL2612 – characteristic curves

4.1.2 KL26x2, KL2634 – service life

⚠ CAUTION

Observe the maximum values!

It is the maximum values that are to be expected that are critical to selection of the right terminal rather than the technical figures for normal operation!

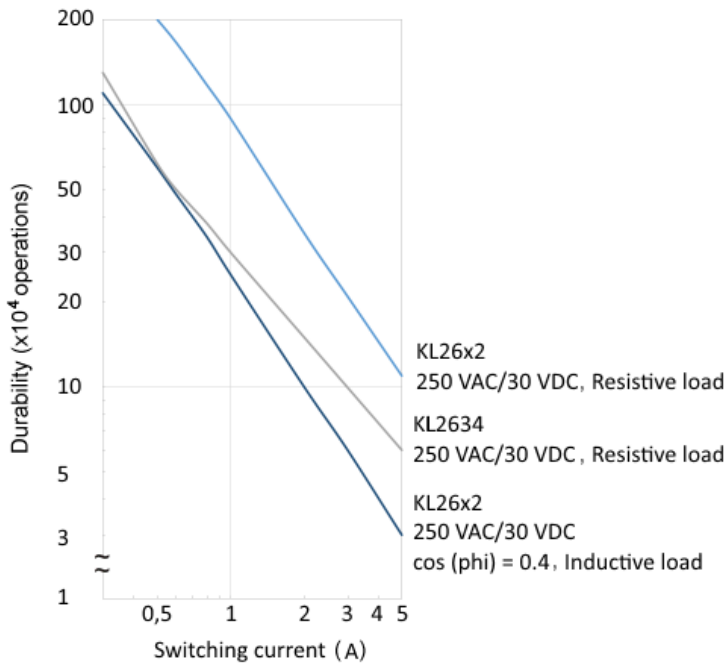


Fig. 24: KL26x2, KL2634 – characteristic curves (does not apply to KL26x2-0010)

For the -0010 variants applies

The relays internally of these terminals would be switched near to the zero voltage crossing of an AC supply. Hereby the lifetime of the outputs is no longer dependent by the absolute lifetime of the relay. The result of an exemplary long term test with the following boundary conditions represent that:

- Each channel of a terminal EL2622-0010 (or KL2622-0010 respectively) switches cyclic one time per second a beforehand complete discharged capacitive load of approximately 40 μF (without any additional resistor in series) to 230 V_{AC} , whereof a permanent current of approx. 4 A is resulting.
- After abortion of the test over more than 200,000 switching cycles per channel the expected lifetime of the terminal outputs are above them of the relays.
- Under the same test conditions but without connection of the neutral wire that disables the operation of the zero voltage detection, the relay was out of order after less than 10 switching cycles.

4.2 Notes on contact-protecting switching of the EL26x2-0010/ KL26x2-0010 terminals

In order to minimize starting currents in the form of capacitive loads in electronic ballasts, it is possible to switch on loads at the time when the mains voltage zero crossing occurs. To this end this Bus Terminal features continuous zero crossing detection for frequencies between 45 Hz and 65 Hz.

At 50 Hz this results in an additional switch on delay to the usual relay delay of 10 ms, at 60 Hz the value is approx. 8.33 ms.

NOTE

Operation only possible at the same phase

No different phases may be applied at terminal points 2 and 6 (400 V voltage between the terminal points is not permitted!).

General notes on commissioning

- In order to be able to use this function, an alternating voltage for internal detection must be present between terminal points 2 and 3. The feeding in of an alternating voltage can be done via the blade contacts, too.
- Under usual grid conditions the terminal switches near the voltage zero crossing with a typical temporal accuracy of <1 ms.
- If no zero crossings of an alternating voltage occur for a prolonged period, the system responds directly to the switch on or switch off request by the PLC, without delay.
- For the EL versions, it is advisable for the PLC to wait until the status becomes "1", indicating successful synchronization of the terminal with the zero crossings of the prevailing alternating voltage. The status bit can be linked via the process data of the terminal and evaluated by the PLC.
- If the "detection" voltage between terminal points 2 and 3 is switched off in the meantime, the Bus Terminal is only able to maintain the synchronization for a very short time. Thereafter, it indicates the loss of synchronization by switching off the corresponding status LED or the status bit. A new synchronization process commences once the supply voltage is restored. Subsequently the switching operations of the relay once again take place near the voltage zero crossing.

● Missing synchronization

i If a relay is switched on without synchronization, a current-minimized switch on operation near the alternating voltage zero crossing cannot be guaranteed.

● Mains quality requirements

i If mains voltage as "detection" voltage is used: In the event of mains voltage faults, which jeopardize precise synchronization with the mains voltage zero crossing, suitable mains filters should be used.

● Temperature compensation of the terminal

i The terminal provides an automatic temperature compensation that allows a soft switching in a wide temperature range. However temperature alteration can be compensated by the terminal in a determined dimension only that results by fast alterations to a decreased precision of the zero crossing detection.

5 Appendix

5.1 Support and Service

Beckhoff and their partners around the world offer comprehensive support and service, making available fast and competent assistance with all questions related to Beckhoff products and system solutions.

Beckhoff's branch offices and representatives

Please contact your Beckhoff branch office or representative for local support and service on Beckhoff products!

The addresses of Beckhoff's branch offices and representatives round the world can be found on her internet pages: <https://www.beckhoff.com>

You will also find further documentation for Beckhoff components there.

Beckhoff Support

Support offers you comprehensive technical assistance, helping you not only with the application of individual Beckhoff products, but also with other, wide-ranging services:

- support
- design, programming and commissioning of complex automation systems
- and extensive training program for Beckhoff system components

Hotline: +49 5246 963 157
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Beckhoff Service

The Beckhoff Service Center supports you in all matters of after-sales service:

- on-site service
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