

Documentation | EN

KL26xx/KS26xx

Relais Output Terminals

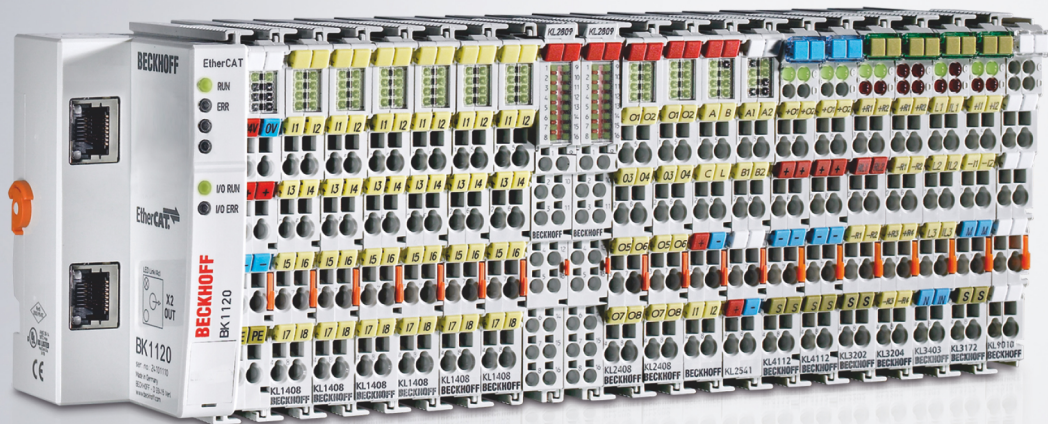


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1 Foreword

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.

The qualified personnel is obliged to always use the currently valid documentation.

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.

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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.

Signal words

The signal words used in the documentation are classified below. In order to prevent injury and damage to persons and property, read and follow the safety and warning notices.

Personal injury warnings

DANGER

Hazard with high risk of death or serious injury.

WARNING

Hazard with medium risk of death or serious injury.

CAUTION

There is a low-risk hazard that could result in medium or minor injury.

Warning of damage to property or environment

NOTICE

The environment, equipment, or data may be damaged.

Information on handling the product



This information includes, for example:
recommendations for action, assistance or further information on the product.

1.3 Documentation Issue Status

Version	Comment
2.6.0	<ul style="list-style-type: none"> • KL/KS2652 added • Product overview updated • Technical data updated • Chapter <i>Installation on mounting rails</i> updated
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 KL2622-0010 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 Suggestions or proposals for documentation

If you have any suggestions or proposals for our documentation, please send us an e-mail stating the documentation title and version number to: documentation@beckhoff.com

1.5 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.

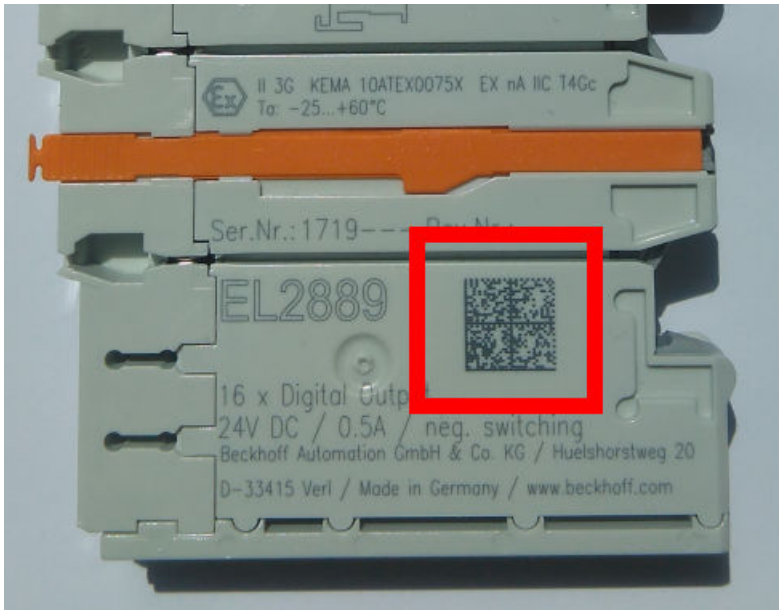


Fig. 1: BIC as data matrix code (DMC, code scheme ECC200)

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.

NOTICE

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	Channels	Nominal voltage	Comment
KL2602/KS2602 [► 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/KS2612 [► 15]	2	125 V _{AC} , 30 V _{DC}	Changeover contacts
KL2622/KS2622 [► 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/KS2631 [► 17]	1	400 V _{AC} , 300 V _{DC}	Make contacts for power contact
KL2634/KS2634 [► 19]	4	250 V _{AC} , 30 V _{DC}	Potential-free make contacts
KL2641 [► 21]	1	230 V _{AC}	Make contacts, 16 A
KL2652/KS2652 [► 24]	2	250 V _{AC} , 300 V _{DC}	Changeover contacts

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

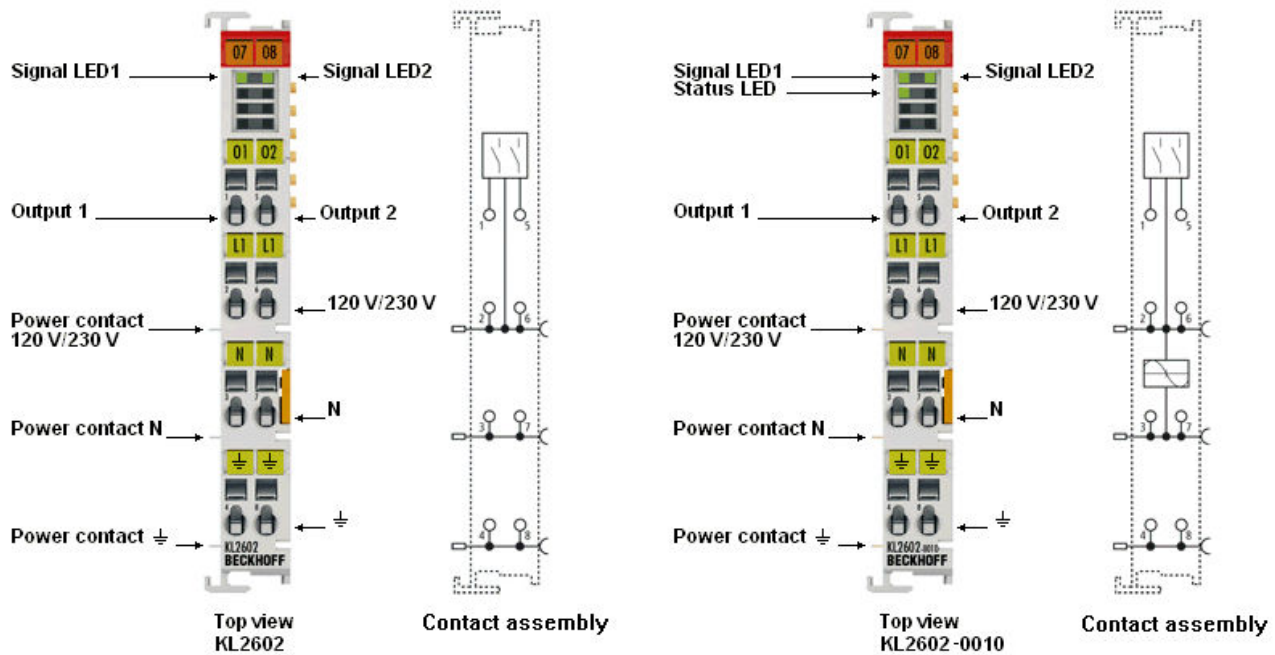


Fig. 2: KL2602-0000, KL2602-0010 – two-channel relay output terminals with power contacts

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.

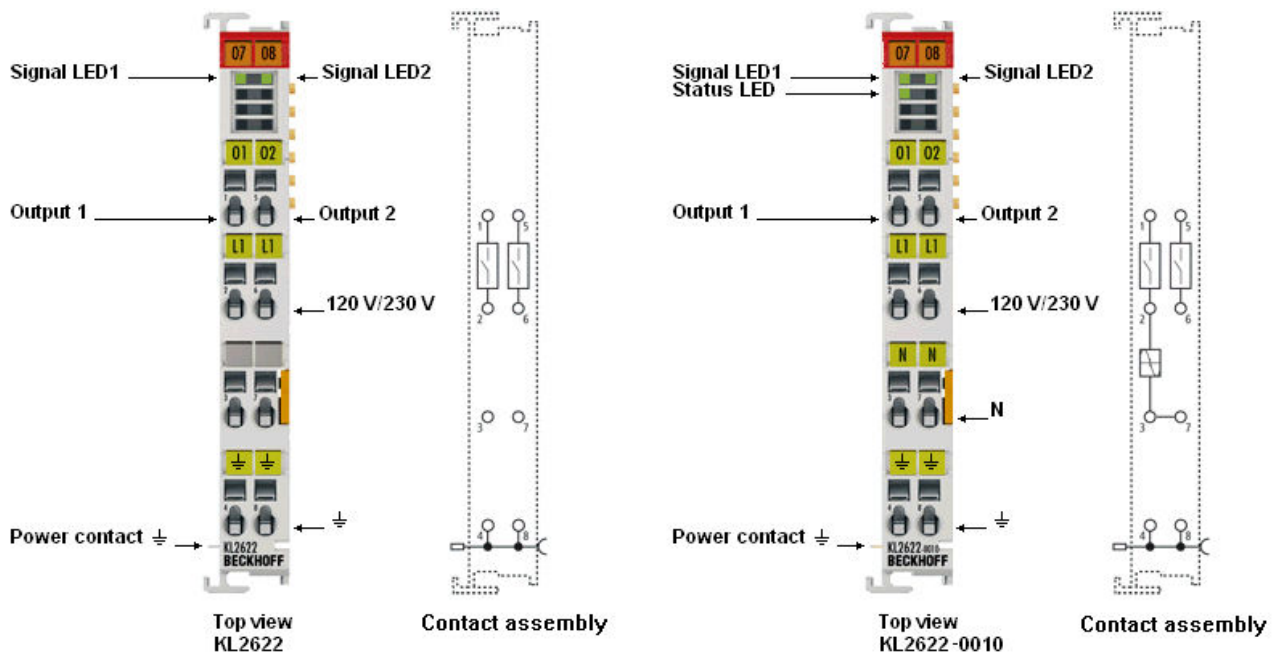


Fig. 3: KL2622-0000, KL2622-0010 – two-channel relay output terminals

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 / KS2602	KL2622 / KS2622
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 [► 27]	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, DNV	

*) Real applicable approvals/markings see type plate on the side (product marking).

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 [► 27]	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	

*) Real applicable approvals/markings see type plate on the side (product marking).

2.2 KL/KS2612 - Introduction

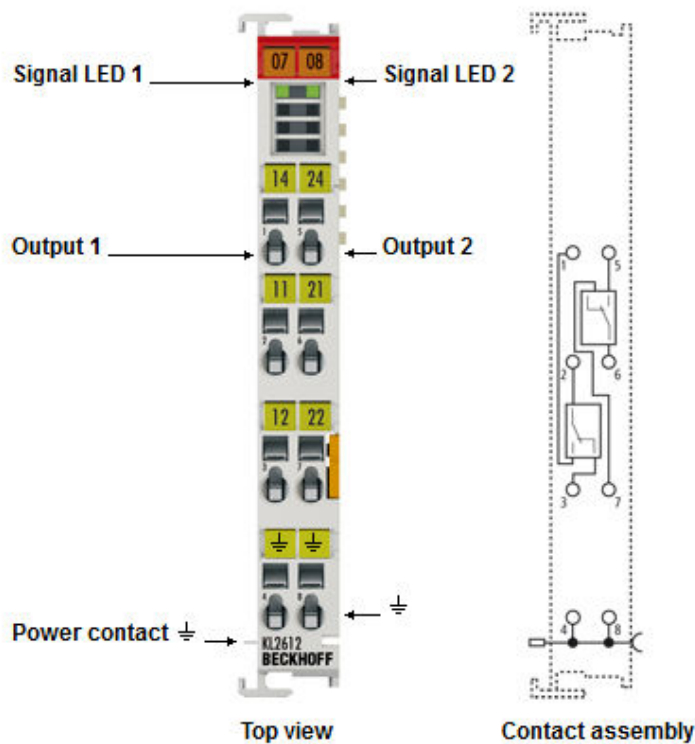


Fig. 4: KL2612 - two-channel relay output terminal with changeover contacts

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
Pluggable wiring	for all KSxxxx terminals
Weight	approx. 80 g
Dimensions (W x H x D)	15 mm x 100 mm x 70 mm (width aligned 12 mm)
Mounting [► 27]	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, DNV

*) Real applicable approvals/markings see type plate on the side (product marking).

2.3 KL/KS2631 - Introduction

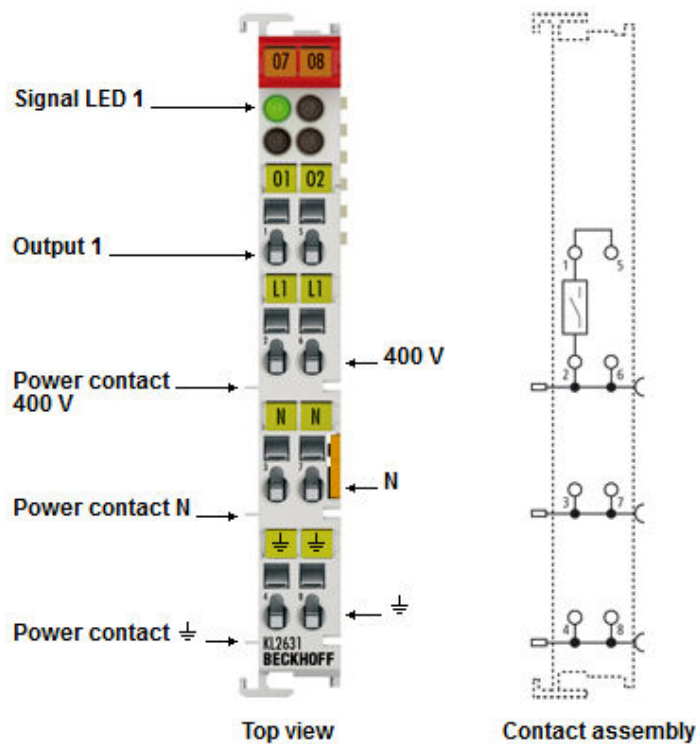


Fig. 5: KL2631 - single-channel relay output terminal 400 V_{AC}, 300 V_{DC}

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 [► 27]	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, DNV

*) Real applicable approvals/markings see type plate on the side (product marking).

2.4 KL2634 - Introduction

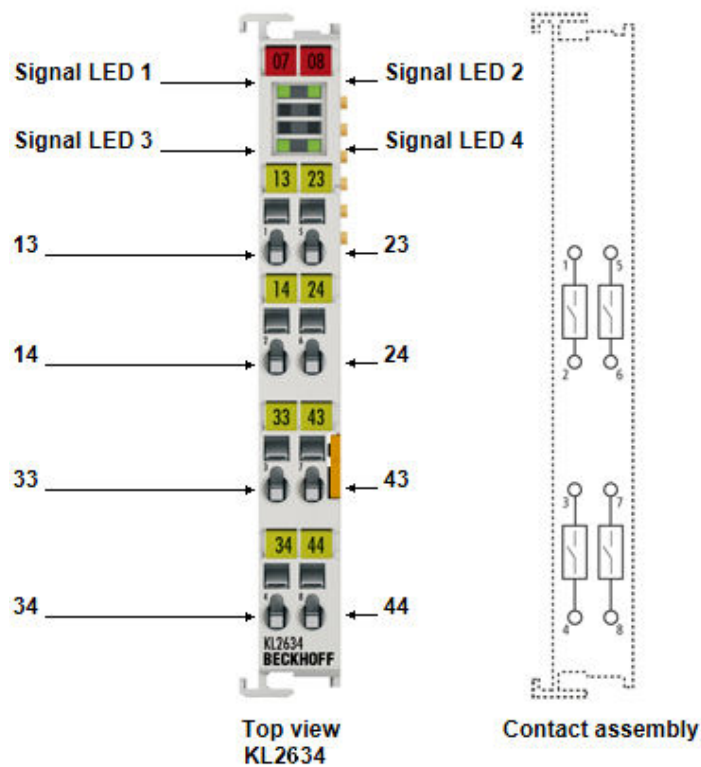


Fig. 6: KL2634 - four-channel relay output terminal

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 [► 27]	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

*) Real applicable approvals/markings see type plate on the side (product marking).

2.5 KL2641 - Introduction

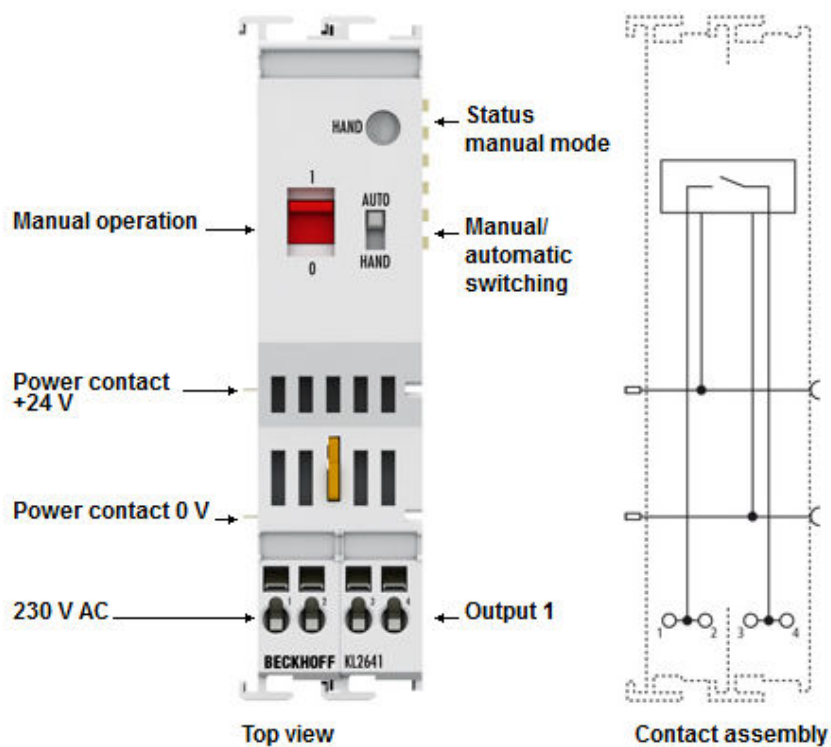


Fig. 7: KL2641 - single-channel relay output terminal, 230 V_{AC}, 16 A, bistable, manual operation

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

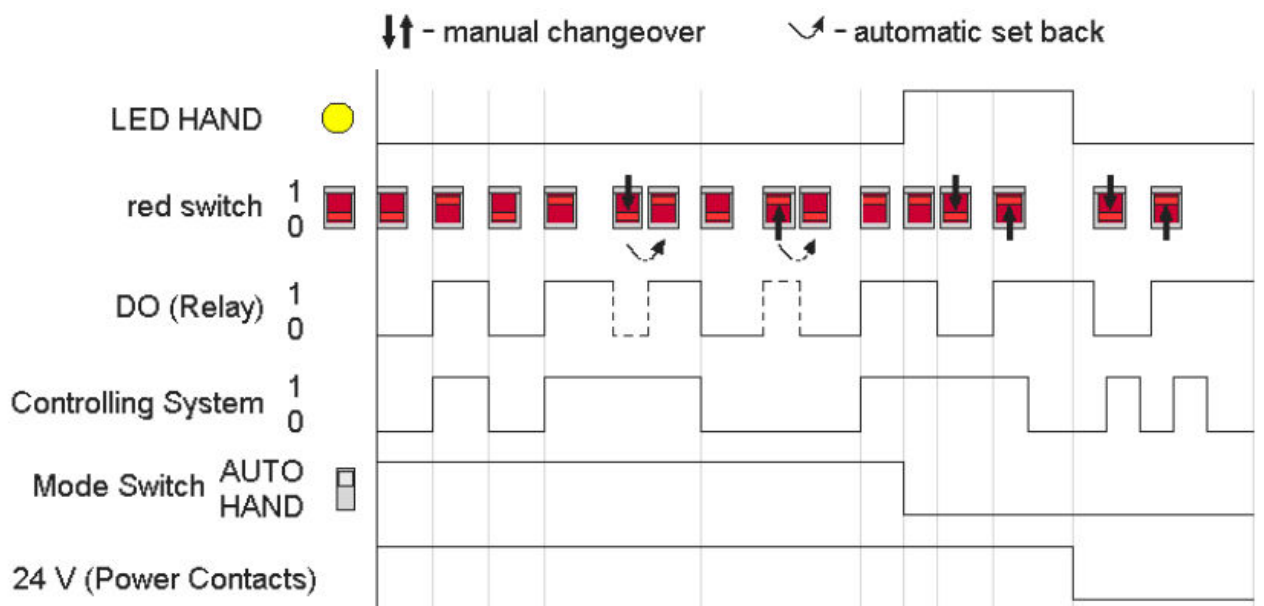


Fig. 8: KL2641 - Example

Standards

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} (U _L : 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 [► 27]	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

*) Real applicable approvals/markings see type plate on the side (product marking).

2.6 KL/KS2652 - Introduction

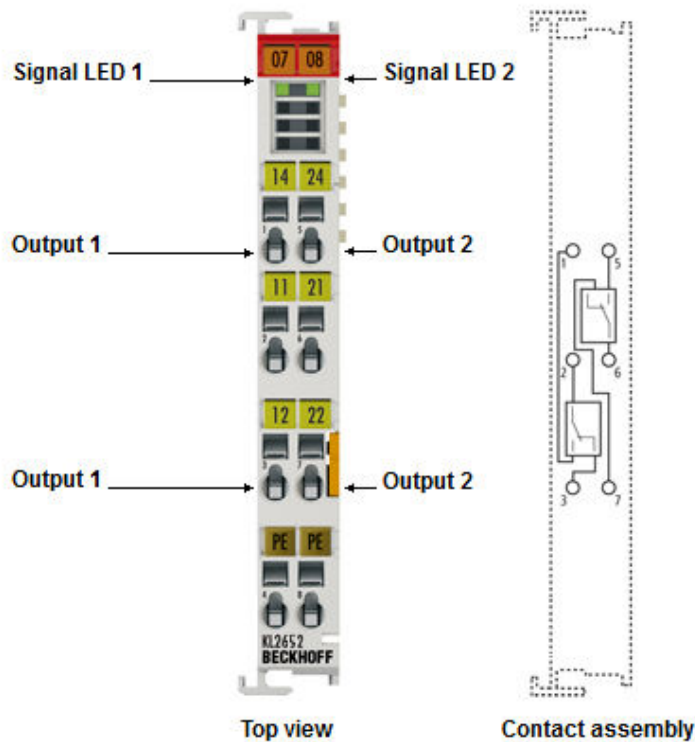


Fig. 9: KL2652 - two-channel relay output terminal with changeover contacts, 230 V_{AC}, 300 V_{DC}, 5 A

Controlled by the automation device, the KL/KS2652 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/KS2652.

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.

2.6.1 Technical data

Technical data	KL2652 / KS2652
Number of outputs	2 x change-over
Nominal voltage	250 V _{AC} / 300 V _{DC}
Load type	Ohmic, inductive, lamp load
Max. output current	5 A per channel
Maximum switching capacity with ohmic load	max. 1 A _{AC} max. 1 A _{DC} at 40 V _{DC} max. 0.15 A at 300 V _{DC} (U _L : max. 230 V _{AC} , 1 A)
Minimum permitted load (guide value)	100 mA at 12 V
Response times with nominal load	max. response time 12 ms max. release time 5 ms
Lamp load, control gear	max. input inrush current 6 A
Electrical isolation	1.5 kV (K-bus / field potential) 2.5 kV rated surge voltage
K-Bus current consumption	90 mA
Bit width in process image	2 outputs
Switching cycles mechanical (min.)	5 x 10 ⁶
Switching cycles electrical (min.)	1 x 10 ⁶ (1 A / 250 V _{AC})
Permitted switching frequency at maximum contact load	6 switching operations/min
Configuration	no address or configuration settings required
Special features	reverse switching realizable
Pluggable wiring	for all KSxxxx terminals
Weight	approx. 55 g
Dimensions (W x H x D)	15 mm x 100 mm x 70 mm (width aligned 12 mm)
Mounting [► 27]	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, cULus, UKCA, EAC

*) Real applicable approvals/markings see type plate on the side (product marking).

3 Mounting and wiring

3.1 Instructions for ESD protection

NOTICE

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 spring contacts (see fig.) 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.

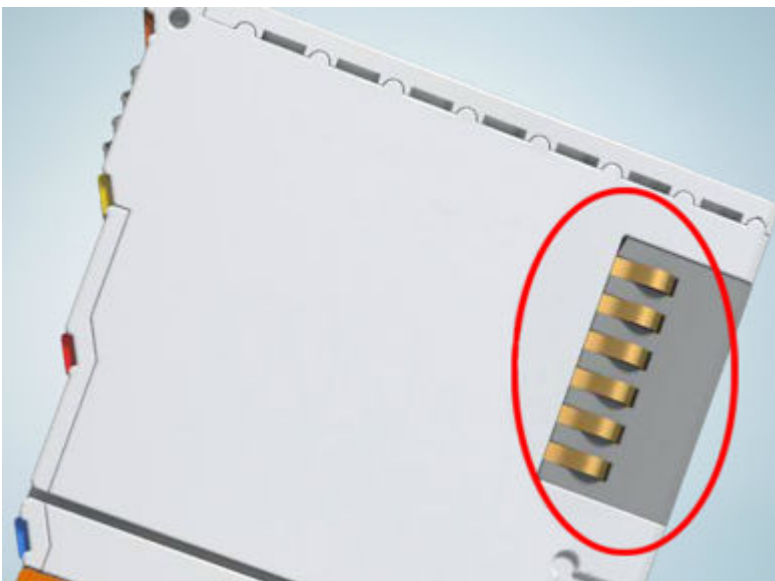


Fig. 10: Spring contacts of the Beckhoff I/O components

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!

The Bus Terminal system and is designed for mounting in a control cabinet or terminal box.

Assembly

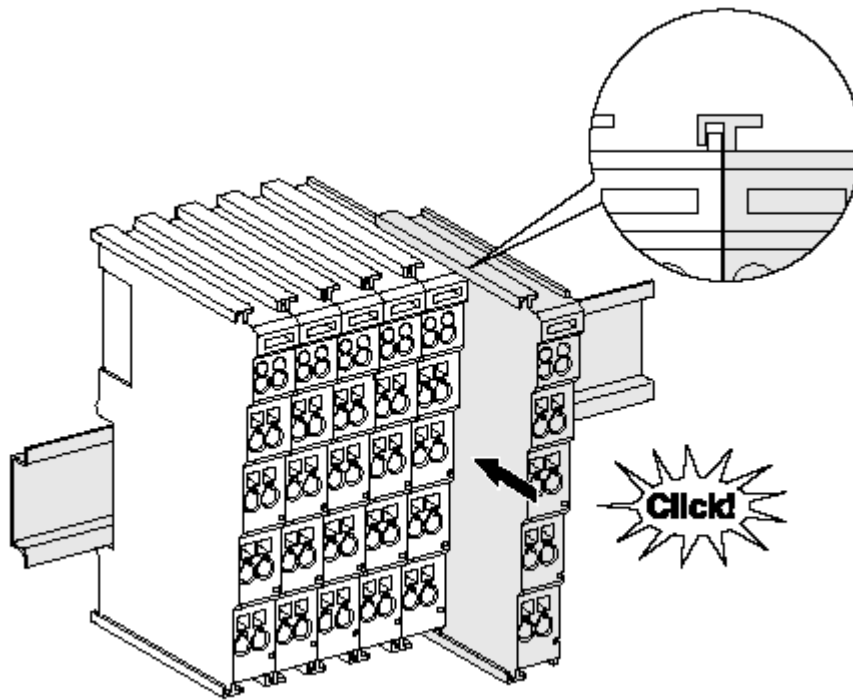


Fig. 11: Attaching on mounting rail

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.

● Fixing of mounting rails

i 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).

NOTICE

Ground the mounting rail!

Ensure that the mounting rail is sufficiently earthed.

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 E-Bus/K-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 points on the Bus Coupler (up to 24 V) or for higher voltages via power feed terminals.



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 (EL91xx, EL92xx or KL91xx, KL92xx) interrupt the power contacts and thus represent the start of a new supply rail.

Power contact \perp

The power contact labeled \perp (earthing connection according to IEC 60417-5017) can be used as a functional earth. For safety reasons this contact mates first when plugging together, and can ground short-circuit currents of up to 125 A.

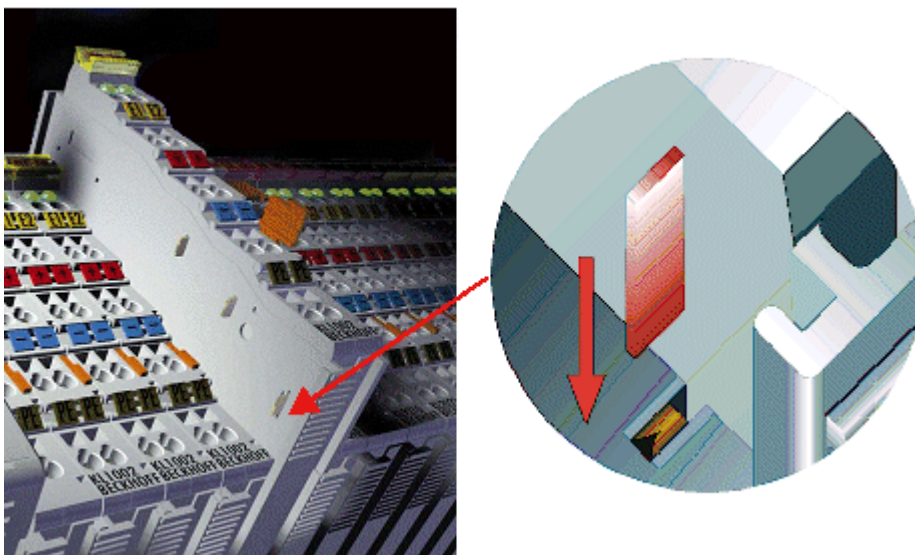


Fig. 12: Power contact on left side

WARNING

Risk of electric shock!

The power contact labeled \perp must not be used for other potentials!

NOTICE

Possible damage of the device

Note that, for reasons of electromagnetic compatibility, the earthing 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 earthing line during insulation testing of a consumer with a nominal voltage of 230 V). For insulation testing, disconnect the earthing 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.

Disassembly

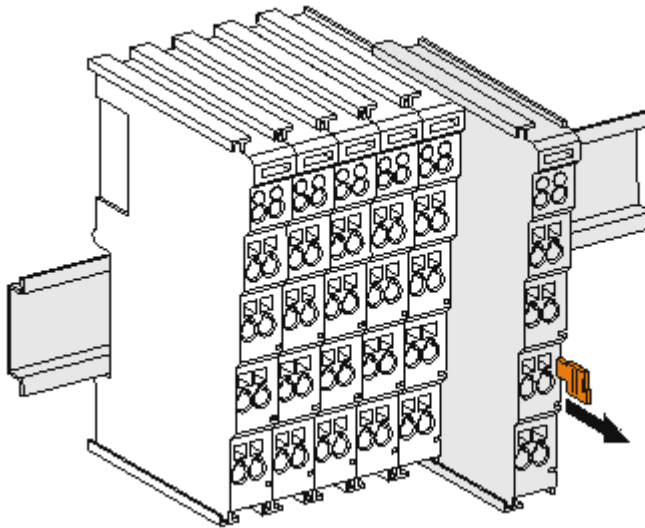


Fig. 13: Disassembling of terminal

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.

3.3 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.

3.4 Connection

3.4.1 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. 14: Standard wiring

The terminals of the ELxxxx and KLxxxx series integrate screwless spring-cage technology for quick and easy wiring.

Pluggable wiring (ESxxxx / KSxxxx)



Fig. 15: 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. 16: High Density Terminals

The terminals from these series with 16/32 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 compacted (ultrasonically welded) strands



Ultrasonically compacted (ultrasonically welded) strands

Ultrasonically compacted (ultrasonically welded) strands can also be connected to the standard and high-density terminals. In this case, please note the tables concerning the wire-size width [► 33]!

3.4.2 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

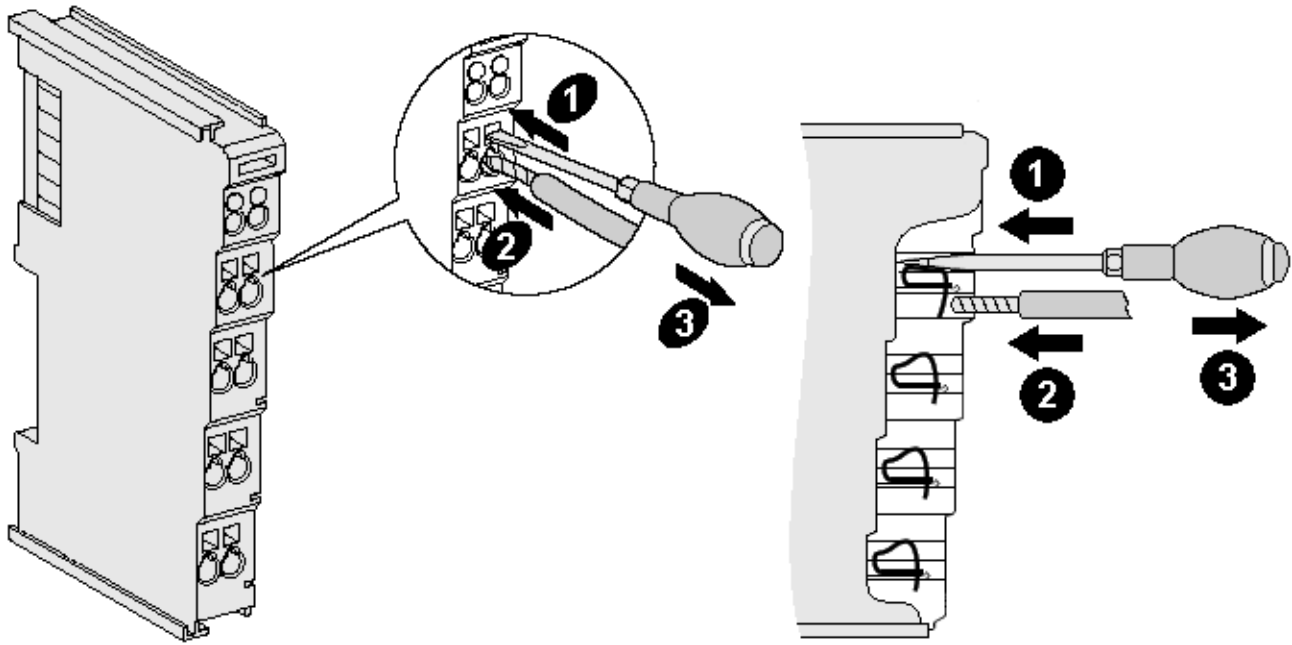


Fig. 17: Connecting a cable on a terminal point

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 (see fig. "Connecting a cable on a terminal point"):

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. When the screwdriver is removed, the terminal point closes automatically and holds the wire securely and permanently in place

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](#) [[► 31](#)]) with 16/32 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 compacted [ultrasonically welded] strands)	only 1.5 mm ² (see notice [► 31])
Wire stripping length	8 ... 9 mm

3.4.3 KL/KS2602 - Contact assignment 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!

NOTICE

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})!

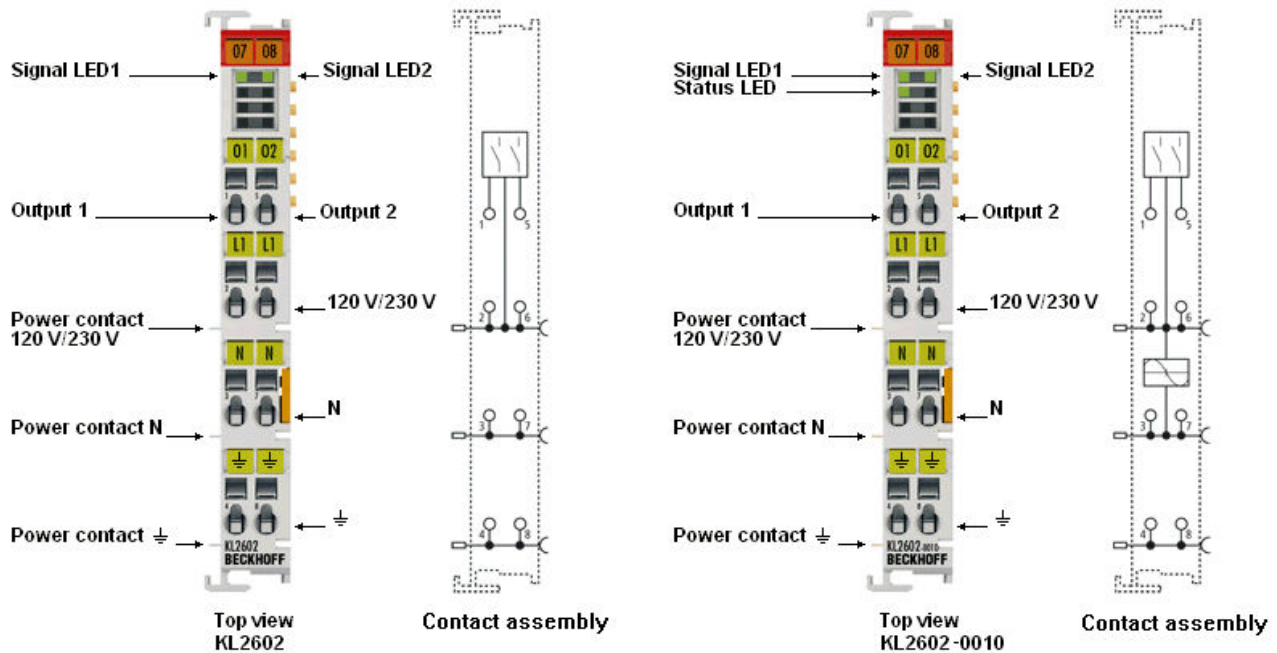


Fig. 18: KL2602, KL2602-0010 - Contact assignment and LEDs

KL/KS2602, KL/KS2602-0010 - Contact assignment

Terminal point		Description
Name	No.	
O1	1	Output 1 (relay)
L1	2	120 / 230 V _{AC} (internally connected to terminal point 6 and L power contact)
N	3	Neutral conductor (internally connected to terminal point 7 and N power contact)
⏏	4	Earth contact (internally connected to terminal point 8 and ⏏ power contact)
O2	5	Output 2 (relay)
L1	6	120 / 230 V _{AC} (internally connected to terminal point 2 and L power contact)
N	7	Neutral conductor (internally connected to terminal point 3 and N power contact)
⏏	8	Earth contact (internally connected to terminal point 4 and ⏏ power contact)

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

LED	Color	State	Meaning
Signal-LED 1 and 2	green	off	No output voltage at Output 1 or Output 2
		on	Output voltage ($\leq 230 \text{ V}_{AC}$ or $\leq 30 \text{ V}_{DC}$) at Output 1 or Output 2
Status-LED (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

3.4.4 KL/KS2622 - Contact assignment 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!

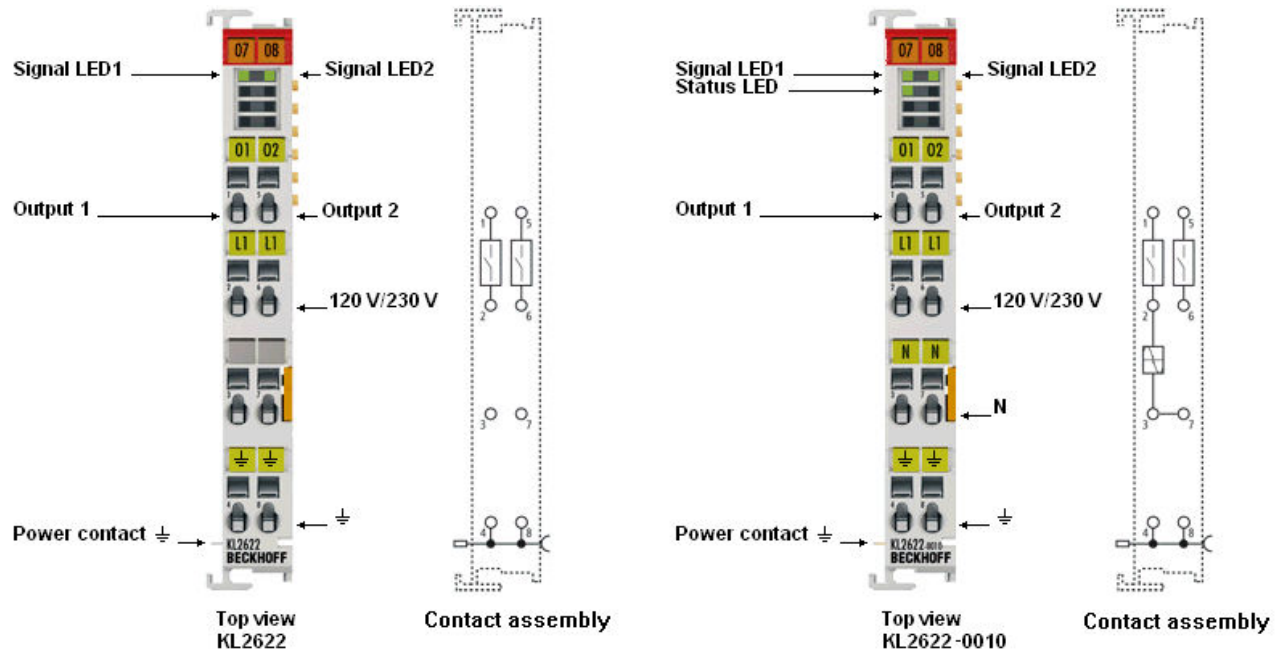


Fig. 19: KL2622, KL2622-0010 - Contact assignment and LEDs

KL/KS2622 - Contact assignment

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

KL/KS2622-0010 - Contact assignment

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)
⊥	4	Earth contact (internally connected to terminal point 8 and ⊥ power contact)
02	5	Output 2 (relay)
L1	6	120 / 230 V _{AC}
N	7	Neutral conductor (internally connected to terminal point 3)
⊥	8	Earth contact (internally connected to terminal point 4 and ⊥ power contact)

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

LED	Color	State	Meaning
Signal LED, 1 and 2	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 ($\leq 230\text{ V}_{AC}$ or $\leq 30\text{ V}_{DC}$) at Output 1 or Output 2
Status LED (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

3.4.5 KL/KS2612 - Contact assignment 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!

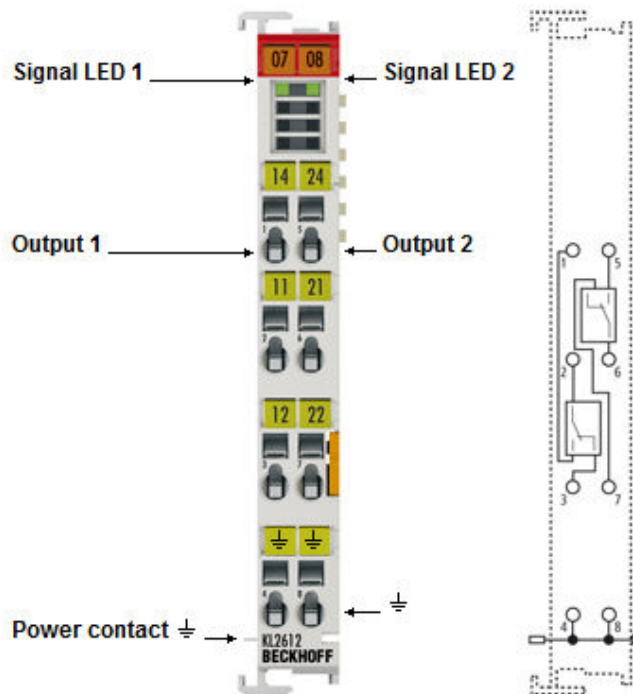


Fig. 20: KL2612 - Contact assignment and LEDs

KL/KS2612 - Contact assignment

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

KL/KS2612-0000 - LED displays

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

3.4.6 KL/KS2631 - Contact assignment 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!

NOTICE

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})!

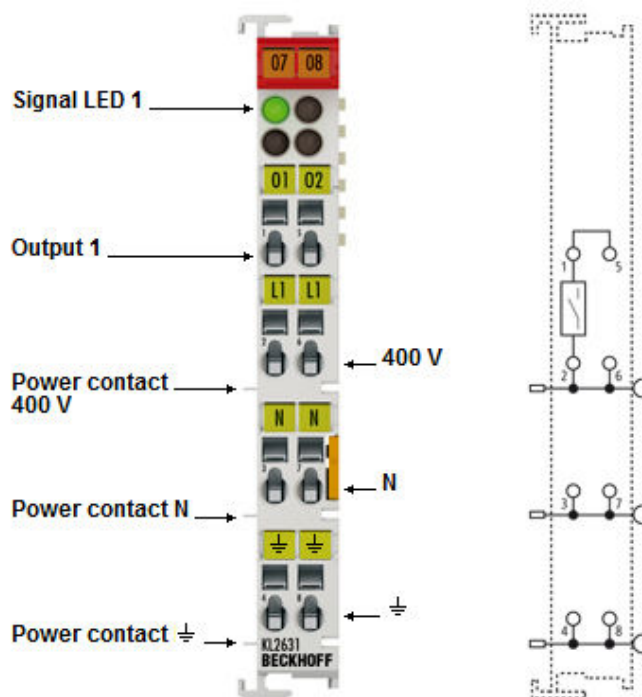


Fig. 21: KL2631 - Contact assignment and LEDs

KL/KS2631 - Contact assignment

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 400 V power contact)
N	3	Neutral conductor (internally connected to terminal point 7 and N power contact)
⏏	4	Earth contact (internally connected to terminal point 8 and ⏏ power contact)
Output 1	5	Output 1 (internally connected to terminal point 1)
400 V	6	400 V (internally connected to terminal point 2 and 400 V power contact)
N	7	Neutral conductor (internally connected to terminal point 3 and N power contact)
⏏	8	Earth contact (internally connected to terminal point 4 and ⏏ power contact)

KL/KS2631 - LED displays

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

3.4.7 KL/KS2634 - Contact assignment 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!

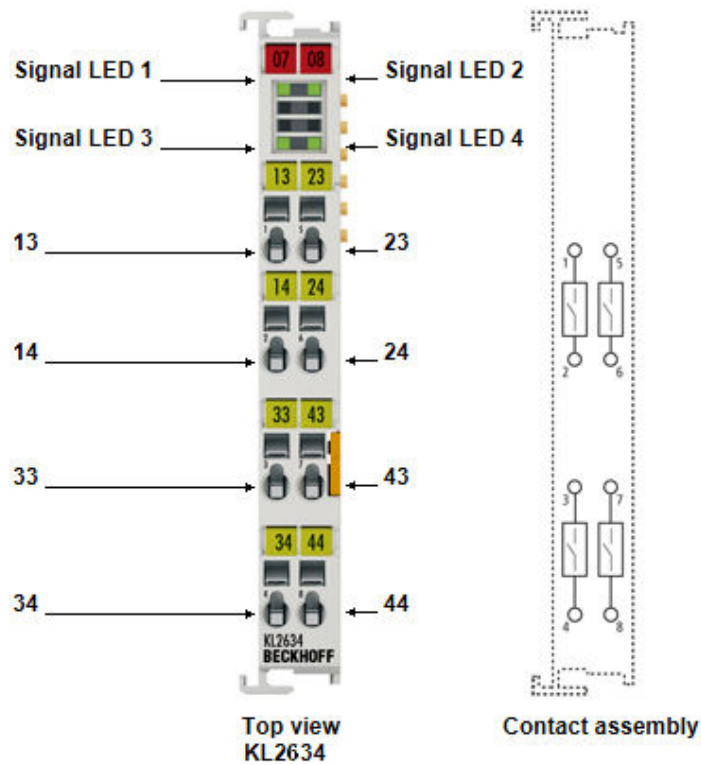


Fig. 22: KL2634 - Contact assignment and LEDs

KL/KS2634 - Contact assignment

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 - LED displays

LED	Color	State	Meaning
Signal LED 1 to 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

3.4.8 KL2641-0000 - Contact assignment 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!

NOTICE

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})!

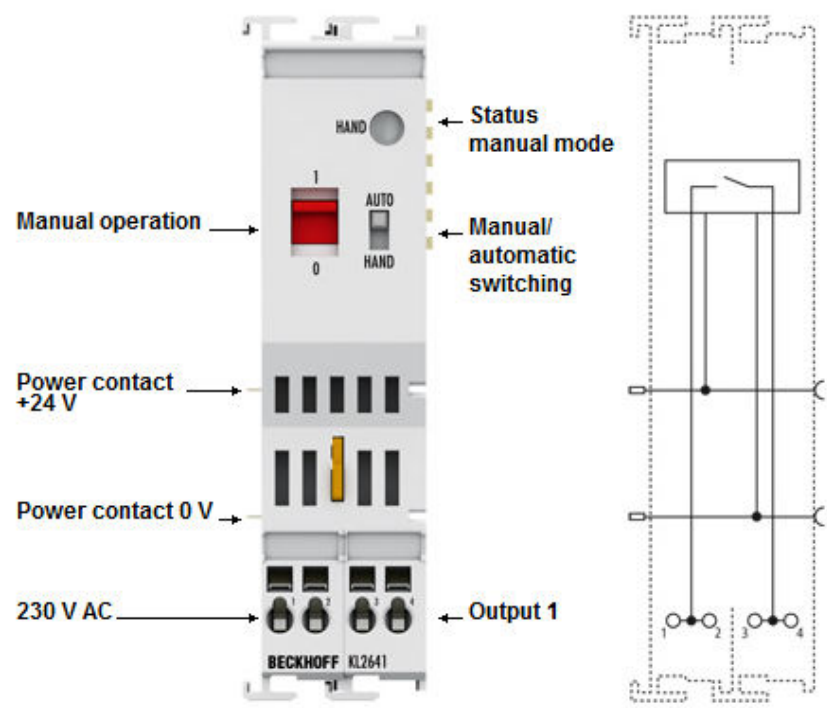


Fig. 23: KL2641 - Contact assignment and LEDs

KL2641 - Contact assignment

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 - LED displays

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

3.4.9 KL/KS2652 - Contact assignment 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!

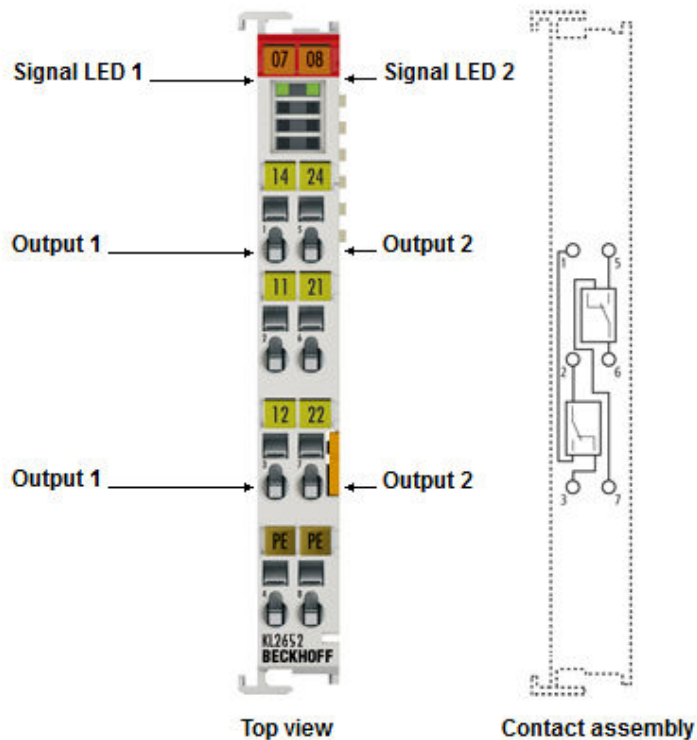


Fig. 24: KL2652 - Contact assignment and LEDs

KL/KS2652 - Contact assignment

Terminal point		Description
Name	No.	
Output 1	1	relay 1: make contact 14
	2	relay 1: middle contact 11 (250 V _{AC} / 300 V _{DC})
	3	relay 1: break contact 12
	4	not implemented
Output 2	5	relay 2: make contact 24
	6	relay 2: middle contact 21 (250 V _{AC} / 300 V _{DC})
	7	relay 2: break contact 22
	8	not implemented

KL/KS2652-0000 - LED displays

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

3.5 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)

3.6 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)

3.7 Continuable documentation for ATEX and IECEx

NOTICE



Continuable documentation about explosion protection according to ATEX and IECEx

Pay also attention to the continuable 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](#) within the download area of your product on the Beckhoff homepage www.beckhoff.com!

4 Commissioning

4.1 Use of the relay terminals

NOTICE

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!

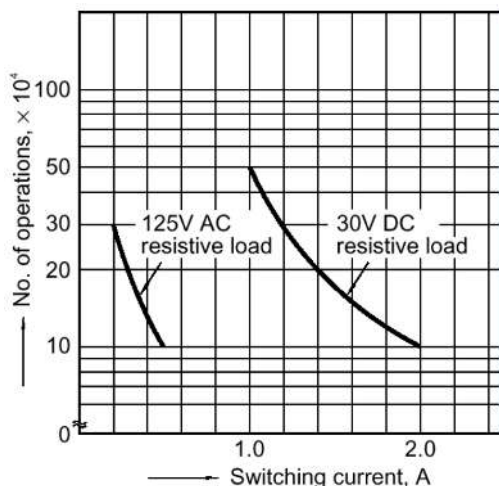


Fig. 25: KL2612 - characteristic curves

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!

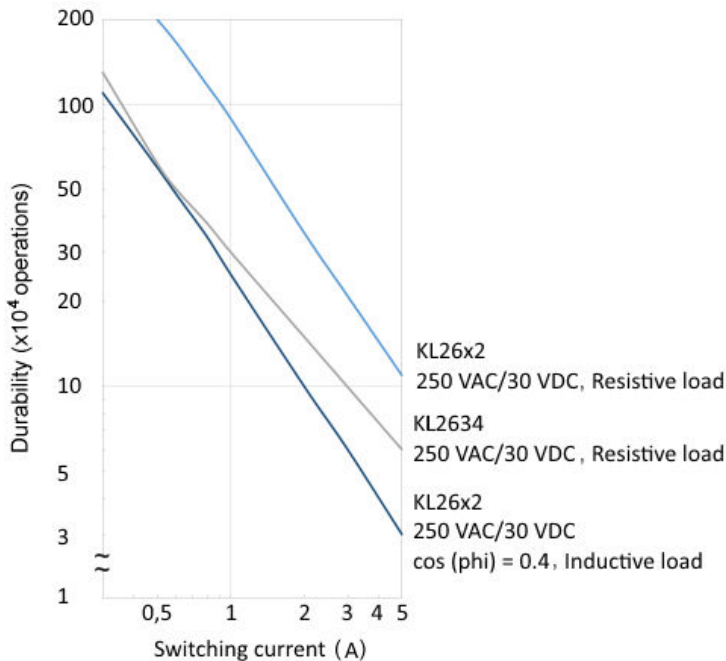


Fig. 26: KL26x2, KL2634 - characteristic curves (does not apply to KL26x2-0010)

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.

NOTICE

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: www.beckhoff.com

You will also find further documentation for Beckhoff components there.

Support

The Beckhoff 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
e-mail: support@beckhoff.com
web: www.beckhoff.com/support

Service

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

- on-site service
- repair service
- spare parts service
- hotline service

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