

Documentation | EN

BK7150

Bus Coupler for CC-Link

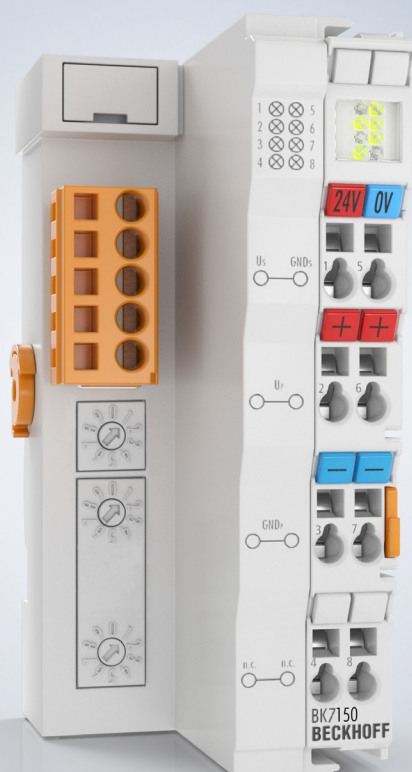


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1 Foreword

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
1.1.0	<ul style="list-style-type: none">• Technical data updated• Ex markings added to technical data• Chapter <i>CC-Link</i> updated• Chapter <i>Instructions for ESD protection</i> added• Chapter <i>Installation on mounting rails</i> updated• Chapter <i>Disposal</i> added• Chapter <i>ATEX - Special conditions (standard temperature range)</i> added• Chapter <i>IECEx - Special conditions</i> added• Design of the safety instructions adapted to IEC 82079-1• New title page
1.0.0	<ul style="list-style-type: none">• Migration

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

2 Product overview

2.1 BK7150 - Introduction

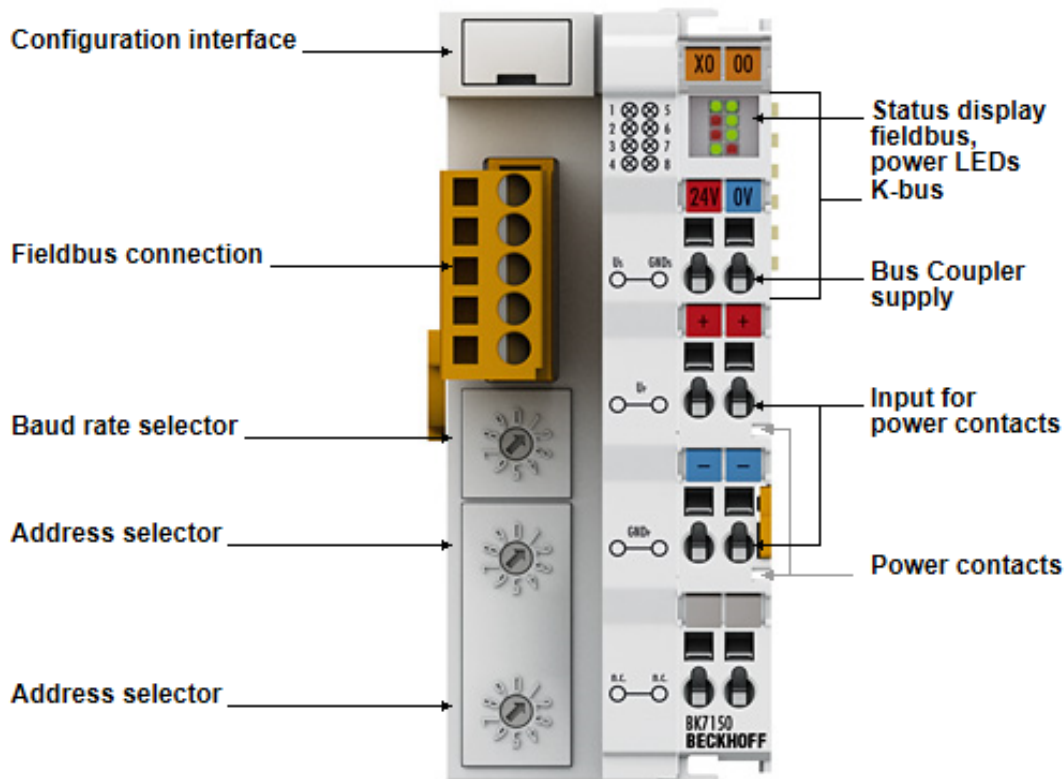


Fig. 1: BK7150 - Bus Coupler for CC-Link

The Compact Bus Couplers BK7150 connects the CC-Link system to the electronic terminal blocks, which can be extended in modular fashion. One unit consists of the Bus Coupler, any number of up to 64 terminals and one end terminal. The K-bus extension technology allows for the connection to one Bus Coupler of up to 255 Bus Terminal spatially distributed.

The Bus Coupler recognizes the connected terminals and automatically generates the affiliations of the inputs/outputs to the bytes of the process image. The first input/output signal is inserted in the first bit of one byte (LSB), beginning from the left. The Bus Coupler inserts further signals in this byte. Inputs and outputs are clearly separated. The Bus Coupler automatically begins a further byte if the number of controller inputs or outputs exceeds 8 bits.

CC-Link is an open fieldbus system. Baud rates up to 10 Mbaud can be selected via a switch, so that the transfer speed can be adapted to the requirement of the technical process.

Complex signal processing for analog I/Os, position measurement, ...

The BK7150 Bus Coupler supports the operation of all Bus Terminals. As far as the user is concerned, handling of the analog inputs/outputs is no different to other series. The information is available in the process image of the controller for processing in the form of a byte-array.

The analog and multi-functional Bus Terminals can be adapted to each specific application using the KS2000 configuration set. Depending on the type, the analog Bus Terminals registers contain temperature ranges, gain values and linearization characteristics. Using the KS2000 software, the required parameters can be set on a PC. The Bus Terminal stores settings permanently and in a fail safe manner.

Optionally, the Bus Terminals can also be controlled by the control system. Via function blocks (FBs), the Programmable Logic Controller (PLC) or the Industrial PC (IPC) handles configuration of the complete periphery during the start up phase. If required, the controller can upload the decentrally created

configuration data in order to centrally manage and store this data. Therefore, new adjustments are not necessary in the event of replacement of a Bus Terminal. The controller carries out the desired setting automatically after switching on.

2.2 Technical Data

System data	CC-Link BK7150					
Number of I/O modules	64					
Number of I/O points	Depending on controller					
Data transfer medium	Shielded 3-core, twisted pair cable					
CC-Link Version	1.1					
Cable-length	1200 m	900 m	400 m	160 m	100 m	
Data transfer rate	156 kbaud	625 kbaud	2.5 Mbaud	5 Mbaud	10 Mbaud	

Technical data	BK7150
Number of Bus Terminals	64 (255 with K-bus extension)
Max. number of bytes fieldbus	32 bytes input and 32 bytes output
Digital peripheral signals	112 inputs/outputs
Analog peripheral signals	16 inputs/outputs
Baud rates	156 kbaud ... 10 Mbaud
Configuration possibility	Via KS2000 software
Bus Connection	1 x open style connector, 5-pin, included
Power Supply	24 V _{DC} (-15%/+20%)
Input current	70 mA + (total K-bus current)/4, 500 mA max.
Starting current	2.5 x continuous current
Recommended fuse	≤ 10 A
K-bus power supply up to	1000 mA
Power contact voltage	max. 24 V _{DC}
Power contact current load	max. 10 A
Dielectric strength	500 V (power contact/supply voltage/fieldbus)
Weight approx.	100 g
Permissible ambient temperature for operation	0°C ... +55°C
Permissible ambient temperature for storage	-25°C ... +85°C
Permissible relative humidity	95%, no condensation
Vibration / shock resistance	conforms to EN 60068-2-6 / EN 60068-2-27/29
EMC resistance burst / ESD	conforms to EN 61000-6-2 / EN 61000-6-4
Protection class / installation position	IP20 / variable
Approvals / markings*	CE, UKCA, cULus, EAC, CCC, ATEX [► 22], IECEx [► 23]

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

Ex markings

Standard	Marking
ATEX	II 3 G Ex nA IIC T4 Gc
IECEx	Ex nA IIC T4 Gc

Ordering information	Description
BK7150	CC-Link Compact Bus Coupler for up to 64 Bus Terminals (255 with K-bus extension)

2.3 The Beckhoff Bus Terminal system

Up to 256 Bus Terminals, with 1 to 16 I/O channels per signal form

The Bus Terminal system is the universal interface between a fieldbus system and the sensor / actuator level. A unit consists of a Bus Coupler as the head station, and up to 64 electronic series terminals, the last one being an end terminal. Up to 255 Bus Terminals can be connected via the K-Bus extension. For each technical signal form, terminals are available with one, two, four or eight I/O channels, which can be mixed as required. All the terminal types have the same mechanical construction, so that difficulties of planning and design are minimized. The height and depth match the dimensions of compact terminal boxes.

Decentralized wiring of each I/O level

Fieldbus technology allows more compact forms of controller to be used. The I/O level does not have to be brought to the controller. The sensors and actuators can be wired decentrally, using minimum cable lengths. The controller can be installed at any location within the plant.

Industrial PCs as controllers

The use of an Industrial PC as the controller means that the operating and observing element can be implemented in the controller's hardware. The controller can therefore be located at an operating panel, in a control room, or at some similar place. The Bus Terminals form the decentralized input/output level of the controller in the control cabinet and the subsidiary terminal boxes. The power sector of the plant is also controlled over the bus system in addition to the sensor/actuator level. The Bus Terminal replaces the conventional series terminal as the wiring level in the control cabinet. The control cabinet can have smaller dimensions.

Bus Couplers for all usual bus systems

The Beckhoff Bus Terminal system unites the advantages of a bus system with the possibilities of the compact series terminal. Bus Terminals can be driven within all the usual bus systems, thus reducing the controller parts count. The Bus Terminals then behave like conventional connections for that bus system. All the performance features of the particular bus system are supported.

Mounting on standardized mounting rails

The installation is standardized thanks to the simple and space-saving mounting on a standardized mounting rail (EN 60715, 35 mm) and the direct wiring of actuators and sensors, without cross connections between the terminals. The consistent labelling scheme also contributes.

The small physical size and the great flexibility of the Bus Terminal system allow it to be used wherever a series terminal is also used. Every type of connection, such as analog, digital, serial or the direct connection of sensors can be implemented.

Modularity

The modular assembly of the terminal strip with Bus Terminals of various functions limits the number of unused channels to a maximum of one per function. The presence of two channels in one terminal is the optimum compromise of unused channels and the cost of each channel. The possibility of electrical isolation through potential feed terminals also helps to keep the number of unused channels low.

Display of the channel state

The integrated LEDs show the state of the channel at a location close to the sensors and actuators.

K-Bus

The K-Bus is the data path within a terminal strip. The K-Bus is led through from the Bus Coupler through all the terminals via six contacts on the terminals' side walls. The end terminal terminates the K-Bus. The user does not have to learn anything about the function of the K-Bus or about the internal workings of the terminals and the Bus Coupler. Many software tools that can be supplied make project planning, configuration and operation easy.

Potential feed terminals for isolated groups

The operating voltage is passed on to following terminals via three power contacts. You can divide the terminal strip into arbitrary isolated groups by means of potential feed terminals. The potential feed terminals play no part in the control of the terminals, and can be inserted at any locations within the terminal strip.

Up to 64 Bus Terminals can be used in a terminal block, with optional K-Bus extension for up to 256 Bus Terminals. This count does include potential feed terminals, but not the end terminal.

Bus Couplers for various fieldbus systems

Various Bus Couplers can be used to couple the electronic terminal strip quickly and easily to different fieldbus systems. It is also possible to convert to another fieldbus system at a later time. The Bus Coupler performs all the monitoring and control tasks that are necessary for operation of the connected Bus Terminals. The operation and configuration of the Bus Terminals is carried out exclusively by the Bus Coupler. Nevertheless, the parameters that have been set are stored in each Bus Terminal, and are retained in the event of voltage drop-out. Fieldbus, K-Bus and I/O level are electrically isolated.

If the exchange of data over the fieldbus is prone to errors or fails for a period of time, register contents (such as counter states) are retained, digital outputs are cleared, and analog outputs take a value that can be configured for each output when commissioning. The default setting for analog outputs is 0 V or 0 mA. Digital outputs return in the inactive state. The timeout periods for the Bus Couplers correspond to the usual settings for the fieldbus system. When converting to a different bus system it is necessary to bear in mind the need to change the timeout periods if the bus cycle time is longer.

The interfaces

A Bus Coupler has six different methods of connection. These interfaces are designed as plug connectors and as spring-loaded terminals.

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.

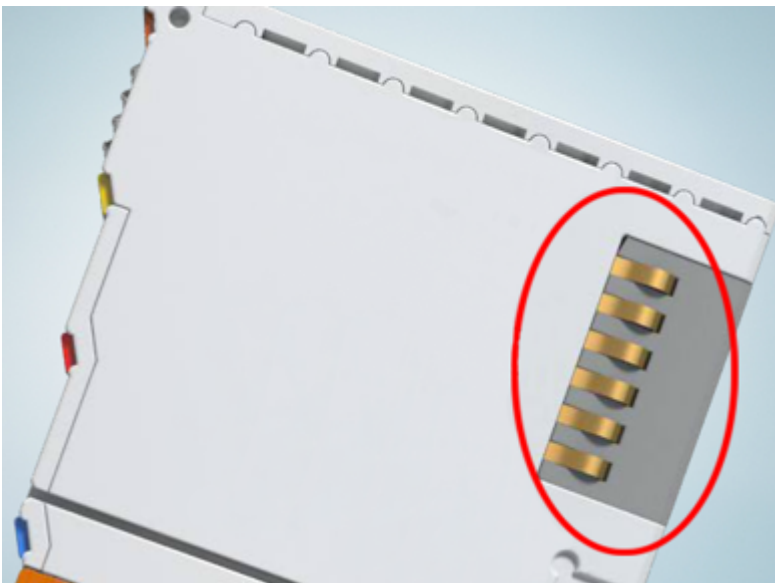


Fig. 2: Spring contacts of the Beckhoff I/O components

3.2 Mounting

⚠ 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!

3.2.1 Dimensions

The system of the Beckhoff Bus Terminals is characterized by low physical volume and high modularity. When planning a project it must be assumed that at least one Bus Coupler and a number of Bus Terminals will be used. The mechanical dimensions of the Bus Couplers are independent of the fieldbus system.

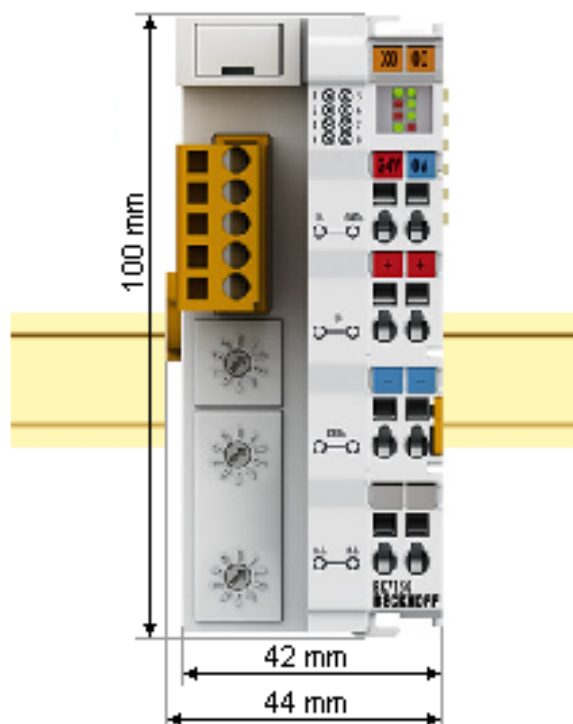


Fig. 3: BK7150 - Dimensions

The total width in practical cases is composed of the width of the Bus Coupler, the KL9010 Bus End Terminal and the width of the bus terminals in use. Depending on function, the Bus Terminals are 12 or 24 mm wide. The front wiring increases the total height of 68 mm by about 5 to 10 mm, depending on the wire thickness.

Mechanical data	BK7150
Design form	compact terminal housing with signal LED
Material	Polyamide (PA 6.6)
Dimensions (W x H x D)	44 x 100 x 68 mm
Mounting	on 35 mm C-rail in accordance with EN 60715 with latching
Stackable by	Double groove-tongue connection
Labelling	Standard terminal block labelling
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

Connection technology	BK7150
Wiring	Cage Clamp® spring-loaded system
Connection cross-section	0.08 mm² ... 2.5 mm², stranded, solid wire, 28 ... 14 AWG
Fieldbus connection	CC-Link open style connector
Power contacts	3 spring contacts
Current loading IMAXX	10 A (125 A short circuit)
Rated voltage	24 V _{DC}

3.2.2 Installation on mounting rails

The Bus Coupler and all the Bus Terminals can be clipped, with a light press, onto a 35 mm mounting rail. A locking mechanism prevents the individual housings from being pulled off again. For removal from the mounting rail the orange colored tension strap releases the latching mechanism, allowing the housing to be pulled off the rail without any force.

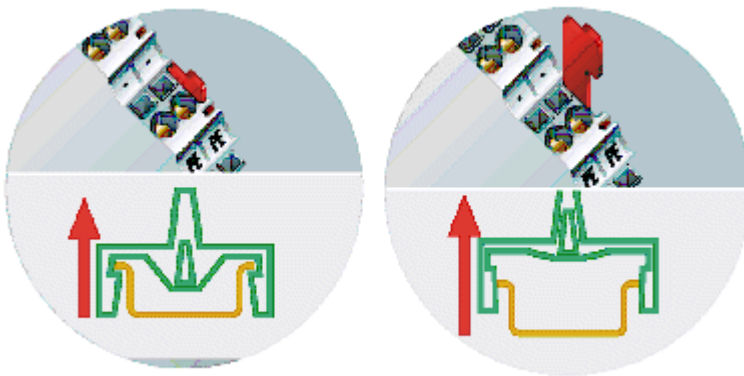


Fig. 4: Release the locking mechanism by pulling the orange tab

Up to 64 Bus Terminals can be attached to the Bus Coupler on the right hand side. When plugging the components together, be sure to assemble the housings with groove and tongue against each other. A properly working connection cannot be made by pushing the housings together on the mounting rail. When correctly assembled, no significant gap can be seen between the attached housings.

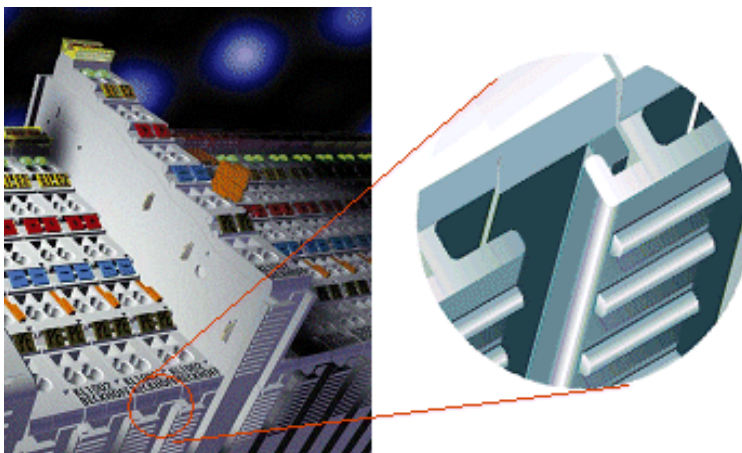


Fig. 5: Groove and tongue of the housings

NOTICE

Bus Terminals should only be pulled or plugged in switched-off state.

Insertion and removal of Bus Terminals is only permitted when switched off. The electronics in the Bus Terminals and in the Bus Coupler are protected to a large measure against damage, but incorrect function and damage cannot be ruled out if they are plugged in under power.

3.2.3 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!

Mounting

The Bus Couplers and Bus Terminals are attached to commercially available 35 mm mounting rails (DIN rail 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 slot and key 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.

Locking mechanism and fixing bolts

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).

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.

Power contacts

i 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 and EL91xx, EL92xx) 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 earthing. For safety reasons this contact mates first when plugging together, and can ground short-circuit currents of up to 125 A.

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

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

1. Carefully pull the orange-colored lug approximately 1 cm out of the terminal to be disassembled, until it protrudes loosely. The lock with the mounting rail is now released for this terminal, and the terminal can be pulled from the mounting rail 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 away from the mounting rail.

3.2.4 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.

3.3 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!

Up to eight connections enable the connection of solid or finely stranded cables to the Bus Terminals. The terminals are implemented in spring force technology. Connect the cables as follows:

1. Open a spring-loaded terminal by slightly pushing with a screwdriver or a rod into the square opening above the terminal.
2. The wire can now be inserted into the round terminal opening without any force.
3. The terminal closes automatically when the pressure is released, holding the wire safely and permanently.



Shielding

Analog sensors and actuators should always be connected with shielded, pair-wise twisted cables.

3.3.1 Potential groups and insulation testing

Potential groups

A Beckhoff Bus Terminal block usually has three different potential groups:

- The fieldbus interface is electrically isolated (except for individual Low Cost couplers) and forms the first potential group.
- Bus Coupler / Bus Terminal Controller logic, K-bus and terminal logic form a second electrically isolated potential group.
- The inputs and outputs are supplied via the power contacts and form further potential groups.

Groups of I/O terminals can be consolidated to further potential groups via potential supply terminals or separation terminals.

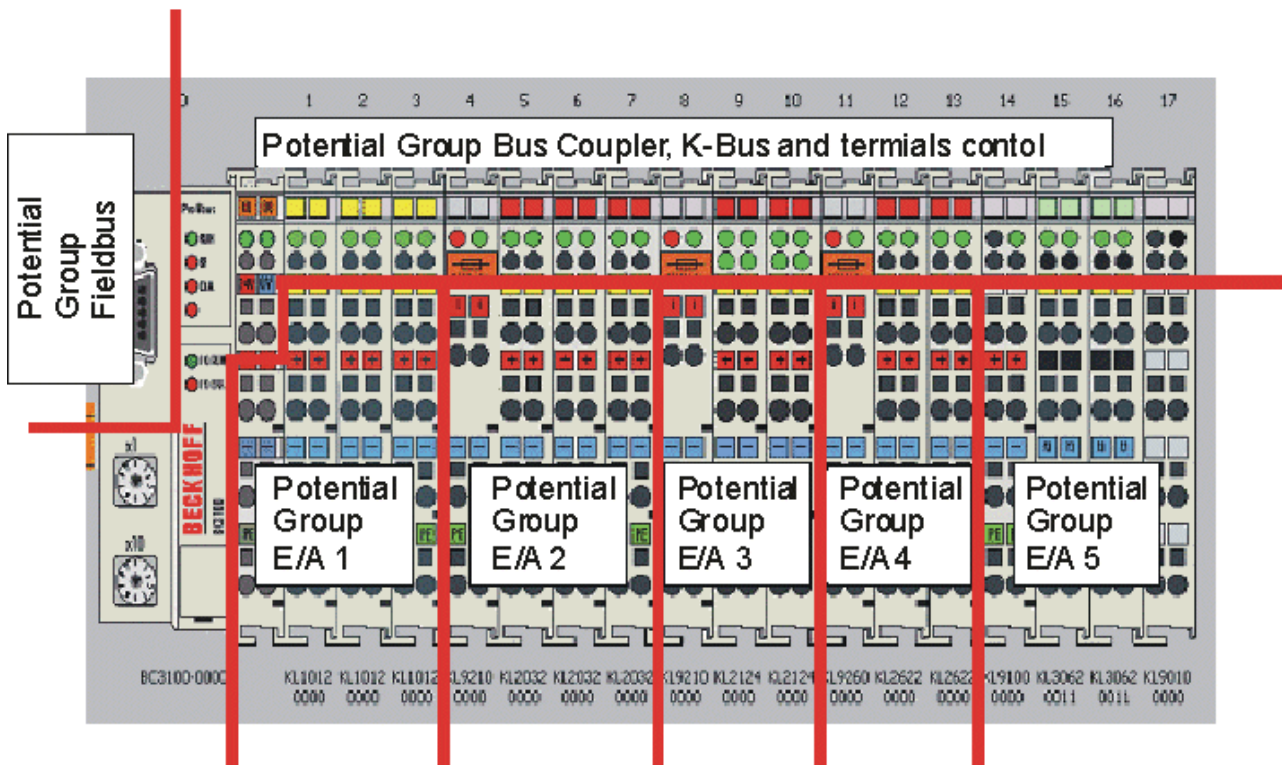


Fig. 6: Potential groups of a Bus Terminal block

Insulation testing

The connection between Bus Coupler / Bus Terminal Controller and Bus Terminals is realized automatically by latching the components. The transfer of the data and the supply voltage for the intelligent electronics in the Bus Terminals is performed by the K-bus. The supply of the field electronics is performed through the power contacts. Plugging together the power contacts creates a supply rail. Since some Bus Terminals (e.g. analog Bus Terminals or 4-channel digital Bus Terminals) are not looped through these power contacts or not completely the Bus Terminal contact assignments must be considered.

The potential feed terminals interrupt the power contacts, and represent the start of a new supply rail. The Bus Coupler / Bus Terminal Controller can also be used for supplying the power contacts.

3.3.2 CC-Link

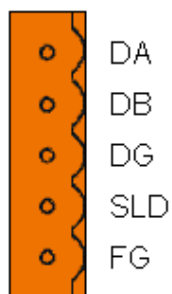


Fig. 7: CC-Link-Anschluss

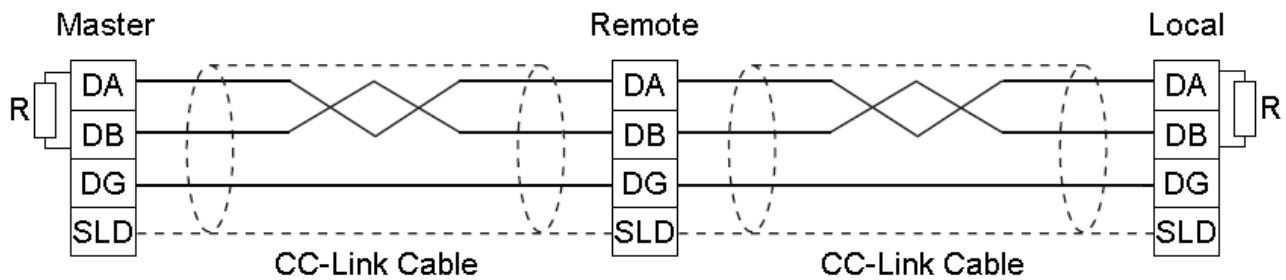


Fig. 8: CC-Link wiring

Use a resistor ($R = 110 \, \Omega$) to terminate open ends.

3.3.3 Power supply

Supply of Bus Coupler / Bus Terminal Controller and Bus Terminals (Us)

⚠ 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!

3.3.3.1 BKxx50 and BKxx51

The Bus Couplers / Bus Terminal Controllers require an operating voltage of $24 \, V_{DC}$. Use a 4 A fuse or a Class 2 power supply to comply with the UL requirements.

The connection is made by means of the upper spring-loaded terminals labelled *Us* and *GNDs*. This supply voltage is used for the electronic components of the Bus Coupler and Bus Terminal Controllers and (via the K-bus) the electronic components of the Bus Terminals. It is galvanically separated from the field level voltage.

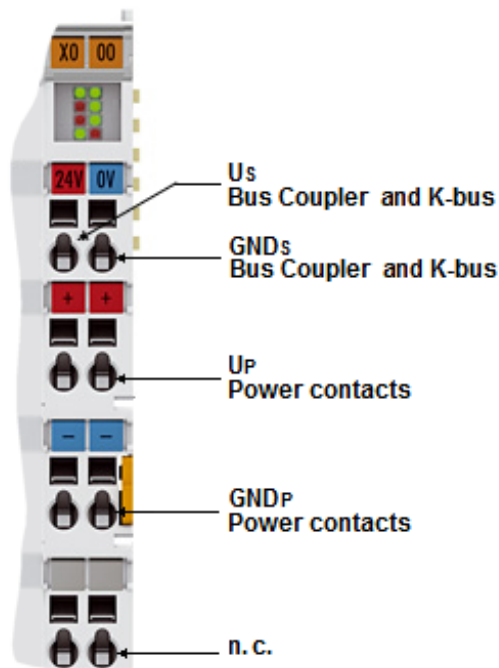


Fig. 9: Power supply connections for BKxx50 and BKxx51

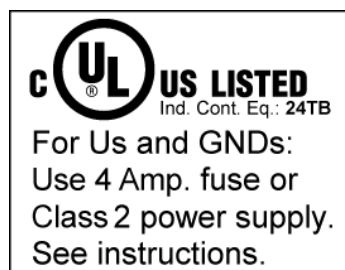


Fig. 10: UL identification

⚠ CAUTION	
	<p>Note the UL requirements for the power supply.</p> <p>To comply with the UL requirements, the 24 V_{DC} supply voltage for Us must originate</p> <ul style="list-style-type: none"> • from an isolated source protected by a fuse of max. 4A (according to UL248) or • from a voltage supply complying with NEC class 2. <p>An NEC class 2 voltage source must not be connected in series or parallel with another NEC class 2 voltage source!</p>
⚠ CAUTION	
	<p>No unlimited voltage sources!</p> <p>To comply with the UL requirements, Us must not be connected with unlimited voltage sources.</p>

3.3.3.2 Configuration and Programming Interface

The standard Bus Couplers have an RS232 interface at the bottom of the front face. The miniature plug connector can be connected to a PC using a connecting cable and the KS2000 configuration software. The interface permits the Bus Terminals to be configured, for example adjusting the amplification factors of the analog channels. The interface can also be used to change the assignments of the bus terminal data to the process image in the Bus Coupler. The functionality of the configuration interface can also be reached via the fieldbus using string communication facility.

3.3.3.3 Electrical isolation

The Bus Couplers / Bus Terminal Controllers operate with three independent potential groups. The supply voltage feeds the K-bus electronics and the K-bus itself. The supply voltage is also used to generate the operating voltage for the fieldbus interface.

Note: All the Bus Terminals are electrically isolated from the K-bus. The K-bus is thus electrically isolated from everything else.

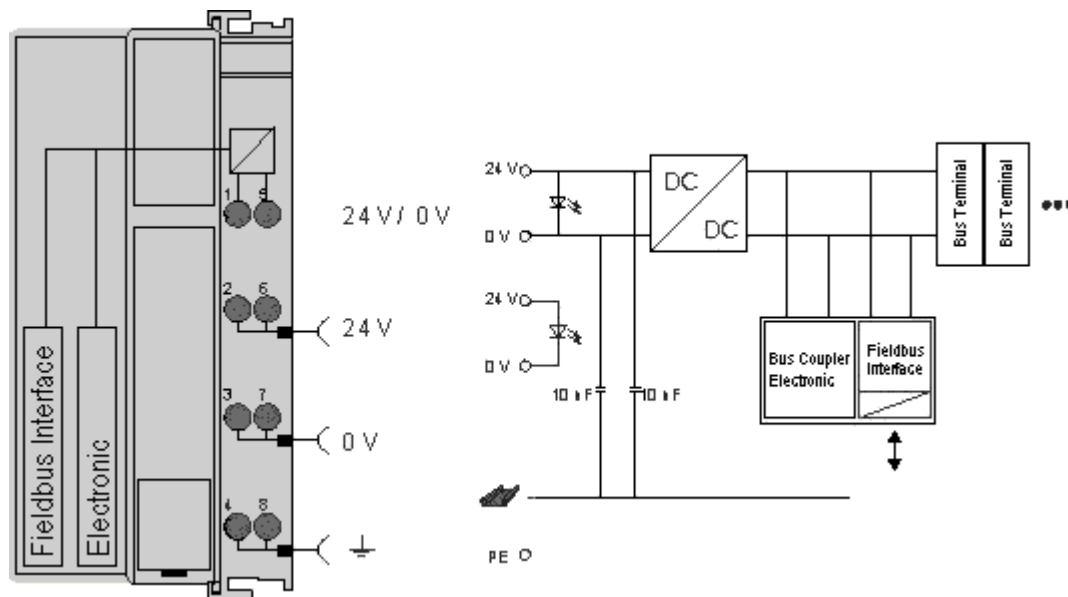


Fig. 11: Potential connection diagram of an EKxxxx

3.3.3.4 Power contacts

Power contacts supply (Up)

The bottom six connections with spring-loaded terminals can be used to feed the supply for the peripherals. The spring-loaded terminals are joined in pairs to a power contact. The power supply for the power contacts has no connection to the power supply for the Bus Couplers / Bus Terminal Controllers.

The spring-loaded terminals are designed for wires with cross-sections between 0.08 mm² and 2.5 mm².

The assignment in pairs and the electrical connection between feed terminal contacts allows the connection wires to be looped through to various terminal points. The current load from the power contact must not exceed 10 A for long periods. The current carrying capacity between two spring-loaded terminals is identical to that of the connecting wires.

Power contacts

Three spring contacts of the power contact connections can be found on the right of the Bus Coupler / Bus Terminal Controller. The spring contacts are hidden in slots so that they cannot be accidentally touched. By attaching a Bus Terminal the blade contacts on the left hand side of the Bus Terminal are connected to the spring contacts. The tongue & groove design of the top and bottom of the Bus Coupler / Bus Terminal Controller and Bus Terminals enables secure fitting of the power contacts.

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 IECEx - Special conditions

WARNING

Observe the special conditions for the intended use of Beckhoff fieldbus components in potentially explosive areas!

- For gas: The equipment shall be installed in a suitable enclosure providing a degree of protection of IP54 according to IEC 60079-15, taking into account the environmental conditions under which the equipment is used!
- For dust (only the fieldbus components of certificate no. IECEx DEK 16.0078X Issue 3): 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!
- The equipment shall only be used in an area of at least pollution degree 2, as defined in IEC 60664-1!
- Provisions shall be made to prevent the rated voltage from being exceeded by transient disturbances of more than 119 V!
- 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 for the use of Beckhoff fieldbus components in potentially explosive areas!
- 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!
- 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!
- The front hatch of certified units may only be opened if the supply voltage has been switched off or a non-explosive atmosphere is ensured!

Standards

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

- EN 60079-0:2011
- EN 60079-15:2010
- EN 60079-31:2013 (only for certificate no. IECEx DEK 16.0078X Issue 3)

Marking

Beckhoff fieldbus components that are certified in accordance with IECEx for use in areas subject to an explosion hazard bear the following markings:

Marking for fieldbus components of certificate no. IECEx DEK 16.0078X Issue 3:

IECEx DEK 16.0078 X
Ex nA IIC T4 Gc
Ex tc IIIC T135°C Dc

Marking for fieldbus components of certificates with later issues:

IECEx DEK 16.0078 X
Ex nA IIC T4 Gc

3.6 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 First Steps

Address-Switch

S3 for Baudrate
 0 – 156 kBaud
 1 – 625 kBaud
 2 – 2,5 MBaud
 3 – 5 MBaud
 4 – 10 MBaud
 5 – 9 no function (reserve)

S1 address x 1
 S2 address x 10

Example:

S3 = 2
 S1 = 4
 S2 = 1

Baudrate = 2,5 MBaud, address = 14

Addressing I/Os from the K-Bus interface

The coupler has an automatic mapping. The coupler reads the terminals and configures the CC-Link interface. The coupler has four different CC-Link mappings.

16 DI/16 DO and/or 4 channel in/out (8 Byte in/out)
 48 DI/48 DO and/or 8 channel in/out (16 Byte in/out)
 80 DI/80 DO and/or 12 channel in/out (24 Byte in/out)
 112 DI/112 DO and/or 16 channel in/out (32 Byte in/out)

On start up, the BK7150 reads the terminals and configures the CC-link interface. The I/O error LED the coupler shows which mapping is active.

I/O Error LED is flashing once, the mapping 1 is active.

I/O Error LED is flashing twice, the mapping 2 is active.

I/O Error LED is flashing three times, the mapping 3 is active.

I/O Error LED is flashing fore times, the mapping 4 is active.

Mapping digital I/Os

RX/RX	Number of occupied stations			
Mapping	1	2	3	4
00-0F	DI/DO	DI/DO	DI/DO	DI/DO
01-1F	Status/Control	DI/DO	DI/DO	DI/DO
02-2F	-	DI/DO	DI/DO	DI/DO
03-3F	-	Status/Control	DI/DO	DI/DO
04-4F	-	-	DI/DO	DI/DO
05-5F	-	-	Status/Control	DI/DO
06-6F	-	-	-	DI/DO
07-7F	-	-	-	Status/Control
Sum	16 DI/16 DO	48 DI/48 DO	80 DI/80 DO	112 DI/122 DO

Status RX	
xxB	Station Ready
xxA	K-Bus Error

Control RY	
xxA	Reset K-Bus

Mapping analogue I/Os:

RWr/RWw	Number of occupied stations			
Mapping	1	2	3	4
x00-x03	AI/AO	AI/AO	AI/AO	AI/AO
x04-x07	-	AI/AO	AI/AO	AI/AO
x08-x11	-	-	AI/AO	AI/AO
X12-x15	-	-	-	AI/AO
Sum	4 AI/4 AO 8 byte in/out	8 AI/8 AO 16 byte In/out	12 AI/12 AO 24 byte in/out	16 AI/16 AO 32 byte in/out

Example 1:

BK7150
 2 x KL1xx4
 2 x KL2xx4
 1 x KL9010
 8 DI / 8 DO
 Mapping 1

Example 2:

BK7150
 4 x KL1xx8
 2 x KL2xx4
 1 x KL9010
 32 DI / 8 DO
 Mapping 2

Example 3:

BK7150
 4 x KL1xx8
 4 x KL2xx8
 2 x KL3xx2
 1 x KL9010
 32 DI / 32 DO / 4 AI
 Mapping 2

Example 4:

BK7150
 4 x KL1xx8
 4 x KL2xx8
 2 x KL3xx2
 2 x KL4xx2
 1 x KL9010
 32 DI / 32 DO / 4 AI / 4 AO
 Mapping 2

Configure with GX IEC Developer**Example 1:**

BK7150 Node 1
 2 x KL1xx4 X100...X10F
 2 x KL2xx4 Y100...Y10F
 1 x KL9010
 8 DI / 8 DO
 Mapping 1

Typ: Master-Station

Modus: Remote Network (Ver. 1-Modus)

Remote-Input (RX) X100

Remote-Output (RY) Y100

Station Typ: Remote device station, Exclusive station 1, 32 points

Example 4:

BK7150 Node 1

4 x KL1xx8 X100...X13F

4 x KL2xx8 Y100...Y13F

2 x KL3xx2 D100...D103

2 x KL4xx2 D200...D203

1 x KL9010

32 DI / 32 DO / 4 AI / 4 AO

Mapping 2

Remote-Input (RX) X100

Remote-Output (RY) Y100

Remote Register (RW_r) D100Remote Register (RW_w) D200

Station Typ: Remote device station, Exclusive station 2, 64 points

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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