BECKHOFF New Automation Technology

Documentation | EN

Beckhoff Products in the Marine Sector

Notes for operation of Beckhoff Products in the Marine Sector

2020-09-29 | Version: 2.1.0

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1 Foreword

1.1 Notes on the documentation

Intended audience

This description is only intended for the use of trained specialists in control and automation engineering who are familiar with the applicable national standards.
It is essential that the documentation and the following notes and explanations are followed when installing and commissioning these components.
It is the duty of the technical personnel to use the documentation published at the respective time of each installation and commissioning.

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

Disclaimer

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

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

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

Trademarks

Beckhoff®, TwinCAT®, EtherCAT®, EtherCAT G®, EtherCAT G10®, EtherCAT P®, Safety over EtherCAT®, TwinSAFE®, XFC®, XTS® and XPlanar® are registered trademarks of and licensed by Beckhoff Automation GmbH. Other designations used in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owners.

Patent Pending

The EtherCAT Technology is covered, including but not limited to the following patent applications and patents: EP1590927, EP1789857, EP1456722, EP2137893, DE102015105702 with corresponding applications or registrations in various other countries.

EtherCAT® is registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

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1.2   Safety instructions

Safety regulations

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

Exclusion of liability

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

Personnel qualification

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

Description of instructions

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

⚠ **DANGER**
Serious risk of injury!
Failure to follow this safety instruction directly endangers the life and health of persons.

⚠ **WARNING**
Risk of injury!
Failure to follow this safety instruction endangers the life and health of persons.

⚠ **CAUTION**
Personal injuries!
Failure to follow this safety instruction can lead to injuries to persons.

NOTE
Damage to environment/equipment or data loss
Failure to follow this instruction can lead to environmental damage, equipment damage or data loss.

ⓘ Tip or pointer

This symbol indicates information that contributes to better understanding.

1.3   Documentation issue status

Version	Comment
2.1.0	• Application examples added
2.0.0	• Chapter about Embeded PCs and about Bus Terminal system added
1.0.0	• First release (only EtherCAT Terminal system)
0.2	• Chapter *Selecting the surge filter terminal* updated
0.1	• First draft

2   Embeddet PCs

The Embedded PCs CX5130, CX5140 and CX9020 support either E-Bus or K-Bus Terminals on their terminal bus. They automatically recognize the type of terminal used.

2.1   Use of surge filter terminals

⚠ CAUTION
Surge filter terminals
The use of surge filter clamps in the Beckhoff terminal systems is required in order to maintain the dielectric strength required by the ship classification company for operation in the marine sector!

Selecting the surge filter terminal

Notes on the selection of the suitable surge filter terminal can be found in the chapters on selecting the surge filter terminal for EtherCAT terminals [▶ 9] (E-Bus) and K-Bus terminals [▶ 10] (K-Bus).

2.2   Technical documentation

NOTE	
	Note the product-specific documentation
	Further information on the installation and commissioning of the Beckhoff Embedded PCs can be found in the corresponding documentation, which can be downloaded from https://www.beckhoff.de/english/downloadfinder/default.htm.

3 EtherCAT Terminal System

3.1 Use of surge filter terminals (EL)

⚠ CAUTION
Surge filter terminals
The use of surge filter clamps in the Beckhoff EtherCAT terminal system is required in order to maintain the dielectric strength required by the ship classification company for operation in the marine sector!

3.1.1 Selecting the Surge Filter Terminal (EL)

EL9550-0010:
For system supply and supply of digital EtherCAT terminals

Use the EL9550-0010 surge filter terminal if only the system supply (Us, E-Bus) is fed in or the system supply (Us, E-Bus) and the field supply (Up, power contacts 24 V) for digital EtherCAT terminals are fed in.

Application:

- Supply via an Embedded PC (CX5130/CX5140/CX9020), an EK110x EtherCAT coupler or an EL9210 for subsequent **digital** EtherCAT terminals with supply via power contacts.

EL9540-0010:
For system supply and supply of digital and analog EtherCAT terminals

Use the EL9540-0010 surge filter terminal if **analog EtherCAT terminals** are fed in via the system supply (Us, E-Bus) or via the field supply (Up, power contacts 24 V).

Application:

- For analog terminals, fed in via the system supply (Us, E-Bus).
- For analog terminals, fed in via the field supply (Up, power contacts 24 V).

Digital EtherCAT terminals can of course also be supplied via the EL9540-0010.

3.2 Technical documentation

NOTE	
	Note the product-specific documentation
	Further information on the installation and commissioning of the individual components of the Beckhoff EtherCAT terminal system can be found in the corresponding documentation, which can be downloaded from https://www.beckhoff.de/english/download/ethercat.htm.

4 Bus Terminal System

4.1 Use of surge filter terminals (KL)

⚠ CAUTION
Surge filter terminals
The use of surge filter clamps in the Beckhoff Bus Terminal system is required in order to maintain the dielectric strength required by the ship classification company for operation in the marine sector!

4.1.1 Selecting the Surge Filter Terminal (KL)

KL9550-0000:
For system supply and supply of digital Bus Terminals

Use the KL9550-0000 surge filter terminal if only the system supply (Us, K-Bus) is fed in or the system supply (Us, K-Bus) and the field supply (Up, power contacts 24 V) for digital Bus Terminals are fed in.

Application:

- Supply via an Embedded PC (CX5130/CX5140/CX9020), a Bus Coupler (e.g. BK9000) or a KL9400 for subsequent **digital** Bus Terminals with supply via power contacts.

KL9540-0000:
For field supply of digital Bus Terminal

Use the KL9540-0000 surge filter terminal if only the field supply (Up, power contacts, 24 V). is fed in for digital Bus Terminals.

EL9540-0010:
For system supply and supply of digital and analog Bus Terminals

Use the KL9540-0010 surge filter terminal if **analog Bus Terminals** are fed in via the system supply (Us, K-Bus) or via the field supply (Up, power contacts 24 V).

Application:

- For analog terminals, fed in via the system voltage (Us, K-Bus), e.g. KL34xx.
- For analog terminals, fed in via the field supply (Up, power contacts 24 V), e.g. KL44xx.

Digital Bus Terminals can of course also be supplied via the KL9540-0010.

4.2 Accuracy

An adapted accuracy range applies to the analog output terminals KL44xx:
< ±0.4 % (referred to the measuring range end value).

4.3 Technical documentation

NOTE
Note the product-specific documentation
Further information on the installation and commissioning of the individual components of the Beckhoff Bus Terminal system can be found in the corresponding documentation, which can be downloaded from https://www.beckhoff.de/english/download/busterm.htm.

5 Appendix

5.1 EtherCAT Terminal System - Application Examples

EtherCAT Coupler with digital EtherCAT Terminals
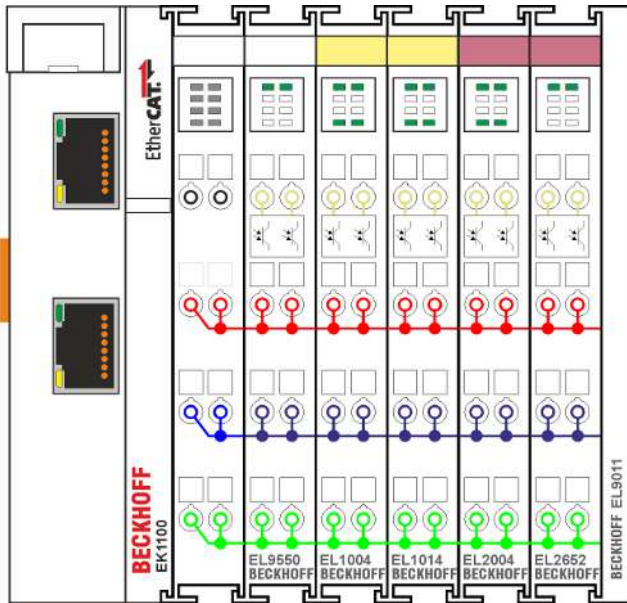

Fig. 1: EtherCAT Coupler with digital EtherCAT Terminals

Position	1	2	3	4	5	6	7
Device	EK1100	EL9550-0010	EL1004	EL1014	EL2004	EL2652	EL9011

Embedded PC with analog and digital EtherCAT Terminals
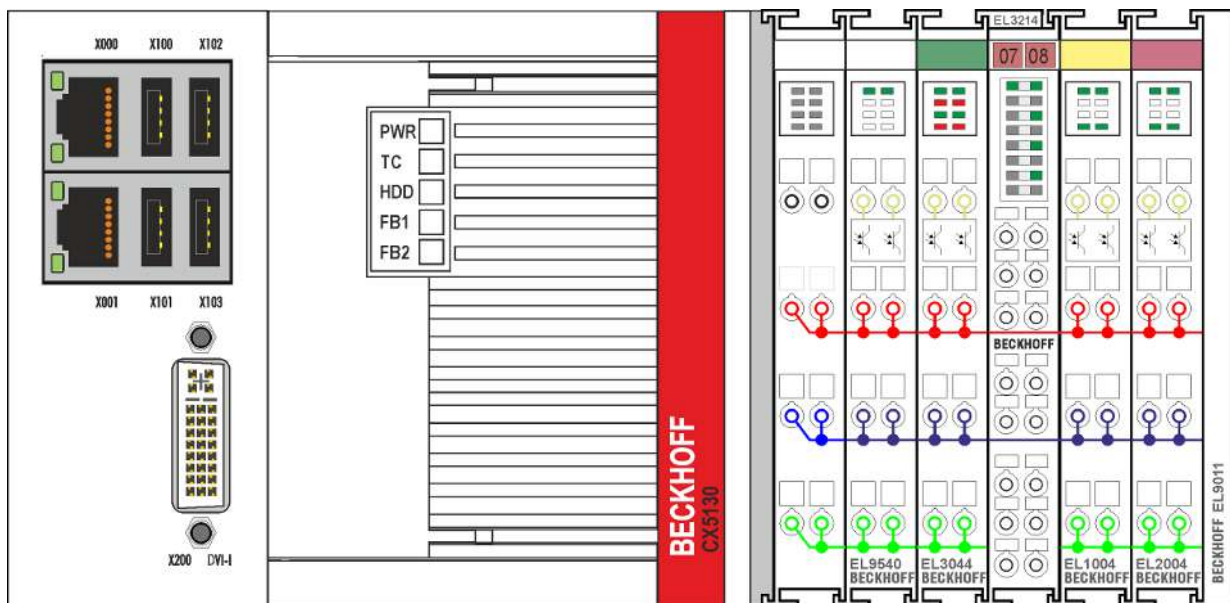
Fig. 2: Embedded PC with analog and digital EtherCAT Terminals

Position	1	2	3	4	5	6	7
Device	CX9020	EL9540-0010	EL3044	EL3214	EL1004	EL2004	EL9011

5.2 Bus Terminal System - Application Examples
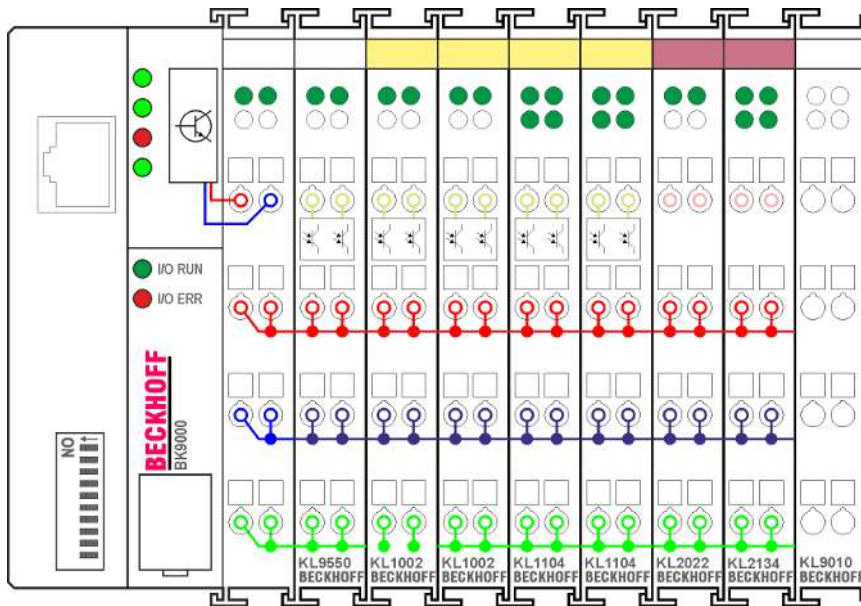
Bus Coupler with digital Bus Terminals

Fig. 3: Bus Coupler with digital Bus Terminals

Position	1	2	3	4	5	6	7	8	9
Device	BK9000	KL9550-0000	KL1002	KL1002	KL1104	KL1104	KL2022	KL2134	KL9010

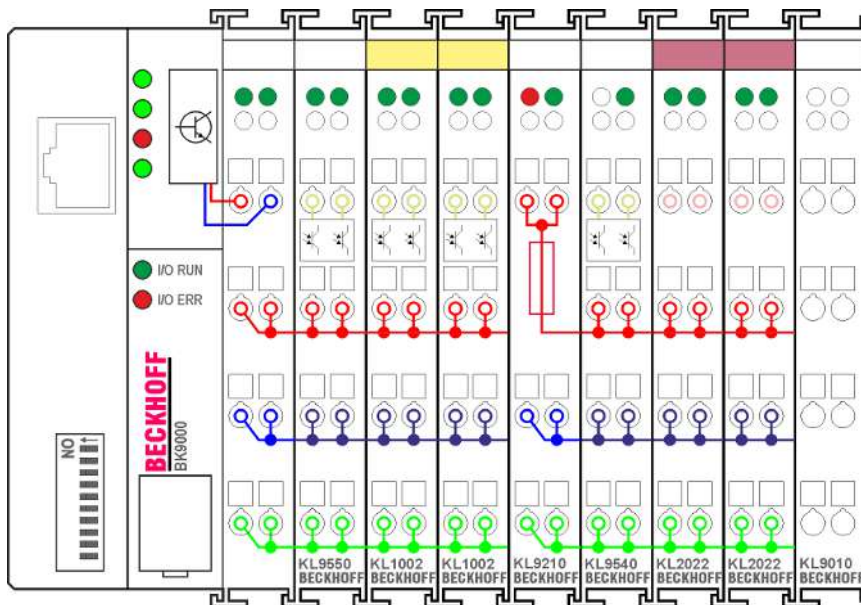**Bus Coupler with digital Bus Terminals and KL9210 / KL9540-0000 for refreshing the Power Contacts**

Fig. 4: Bus Coupler with digital Bus Terminals and KL9210 / KL9540-0000 for refreshing the Power Contacts

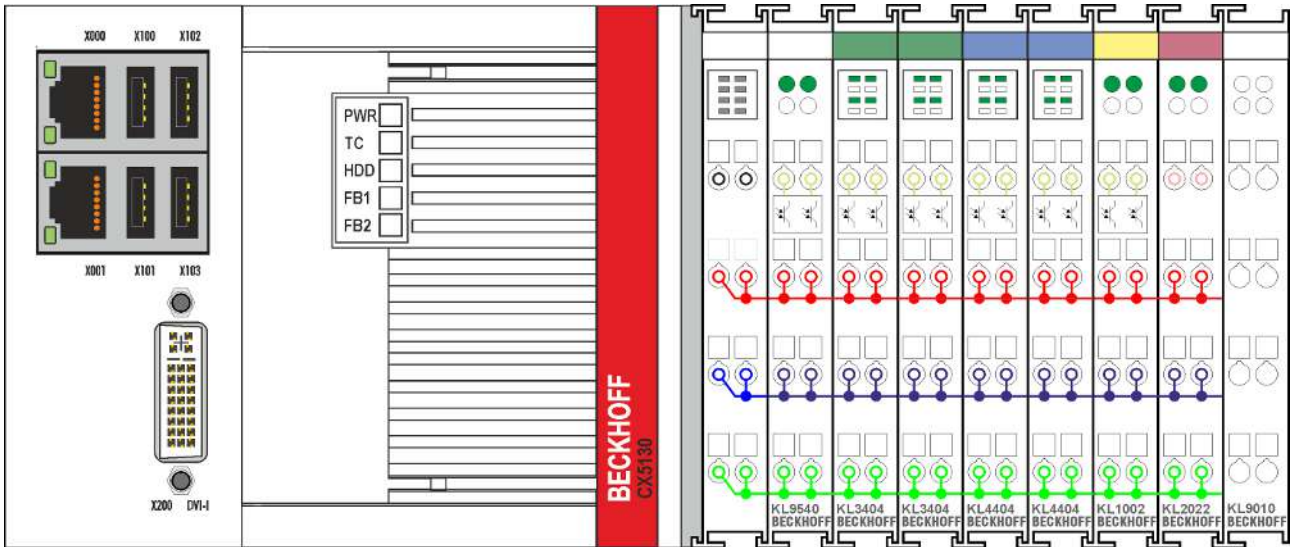| Position	1	2	3	4	5	6	7	8	9
Device	BK9000	KL9550-0000	KL1002	KL1002	KL9210	KL9540-0000	KL2022	KL2022	KL9010

Embedded PC with analog and digital Bus Terminals

Fig. 5: Embedded PC with analog and digital Bus Terminals

Position	1	2	3	4	5	6	7	8	9
Device	CX9020	KL9540-0010	KL3404	KL3404	KL4404	KL4404	KL1002	KL2022	KL9010

5.3 Support and Service

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

Beckhoff's branch offices and representatives

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

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

You will also find further documentation for Beckhoff components there.

Beckhoff Support

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

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

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