BECKHOFF New Automation Technology

Documentation | EN

KL3214

Four-channel HD input terminal for 3-wire connection of resistance sensors

Table of contents

BECKHOFF

Version: 1.3.0

1 Foreword

1.1 Notes on the documentation

Intended audience

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

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

Disclaimer

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

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

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

Trademarks

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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.

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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
1.3.0	• Chapter "Technical data" updated
	• Document structure updated
	• Chapter "Disposal" added
	• New title page
	• Update revision status
1.2.0	• Update Chapter "Instructions for ESD protection"
	• Chapter "Beckhoff Identification Code (BIC)" added
1.1.0	• Design of the safety instructions adapted to IEC 82079-1
	• Update chapter *Notes on the documentation*
	• Update Technical data
	• Chapter *Instructions for ESD protection* added
	• Chapter *Installation instructions for enhanced mechanical load capacity* added
	• Example program added to chapter "KS2000 Configuration software"
	• Correction chapter *Register description*
	• Update chapter *Connection system -> Connection*
1.0.0	• First published
0.5	• Preliminary version (internal only)

Firmware and hardware versions

Documentation Version	KL3214	
	Firmware	**Hardware**
1.3.0	1A	02
1.1.0	1A	01
1.0.0	1A	00
0.5	1A	00

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

2 Product overview

2.1 Introduction
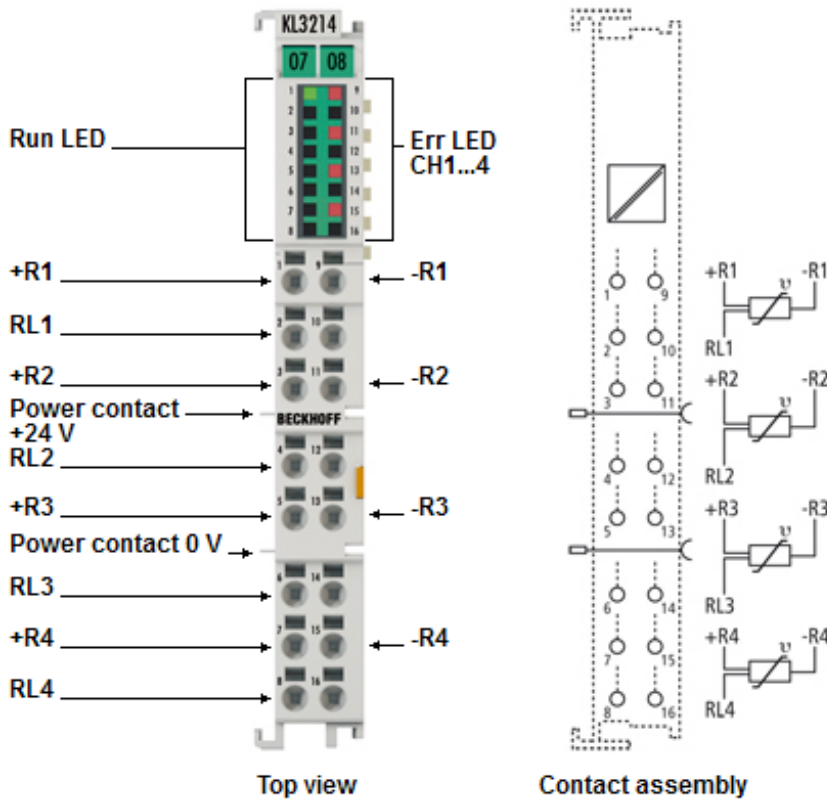
Fig. 1: KL3214-0000

The KL3214 analog HD input terminal allows four resistance sensors to be connected directly on a width of 12 mm.

The Bus Terminal's circuitry can handle sensors using the 3-wire technique. A microprocessor handles linearization across the whole temperature range, which is freely selectable.

The Bus Terminal's standard settings are: resolution 0.1°C. Sensor malfunctions such as broken wires are indicated by error LEDs.

2.2 Technical data

Technical data		KL3214
Number of inputs		4
Sensor types		PT100/200/500/1000, Ni100/120/1000, KTY sensors, Potentiometer (10 Ω … 1.2/4 kΩ)
Connection technology		3-wire
Measuring range	Pt sensors	-200°C ... +850°C
	Ni sensors	-60°C ... +250°C
Measuring current		typ. 0.5 mA (load-dependent)
Resolution		0.1°C per digit
Measuring error (total meas. range)		< ± 0.5°C (for PT sensors)
Conversion time		app. 170 ms
Bit width in the input process image		4 x 16 bit data, 4 x 8 bit status (optional)
Bit width in the output process image		4 x 8 bit Control (optional)
Supply voltage for internal electronic		via the K-bus
Current consumption from K-bus		typically 120 mA
Electrical isolation		500 V (K-bus/signal voltage)
Special features		Broken wire detection
Weight		app. 60 g
Dimensions (W x H x D)		app. 15 mm x 100 mm x 70 mm (width aligned: 12 mm)
Mounting [▶ 11]		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
Enhanced mechanical load capacity		yes, see Installation instructions for terminals with increased mechanical load capacity [▶ 14]
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).

3 Mounting and wiring

3.1 Instructions for ESD protection

NOTE
Destruction of the devices by electrostatic discharge possible! The devices contain components at risk from electrostatic discharge caused by improper handling. • Please ensure you are electrostatically discharged and avoid touching the contacts of the device directly. • Avoid contact with highly insulating materials (synthetic fibers, plastic film etc.). • Surroundings (working place, packaging and personnel) should by 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.
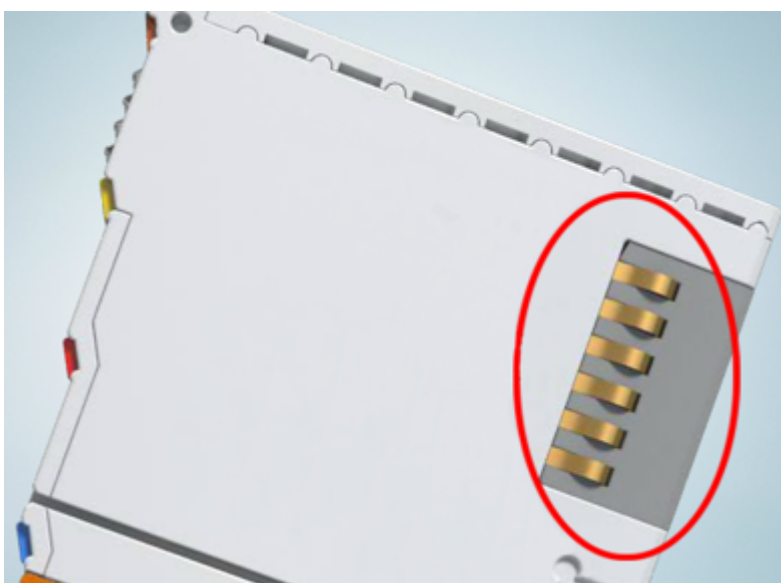
Fig. 2: Spring contacts of the Beckhoff I/O components

3.2   Installation on mounting rails

⚠ WARNING
Risk of electric shock and damage of device!
Bring the bus terminal system into a safe, powered down state before starting installation, disassembly or wiring of the bus terminals!

Assembly
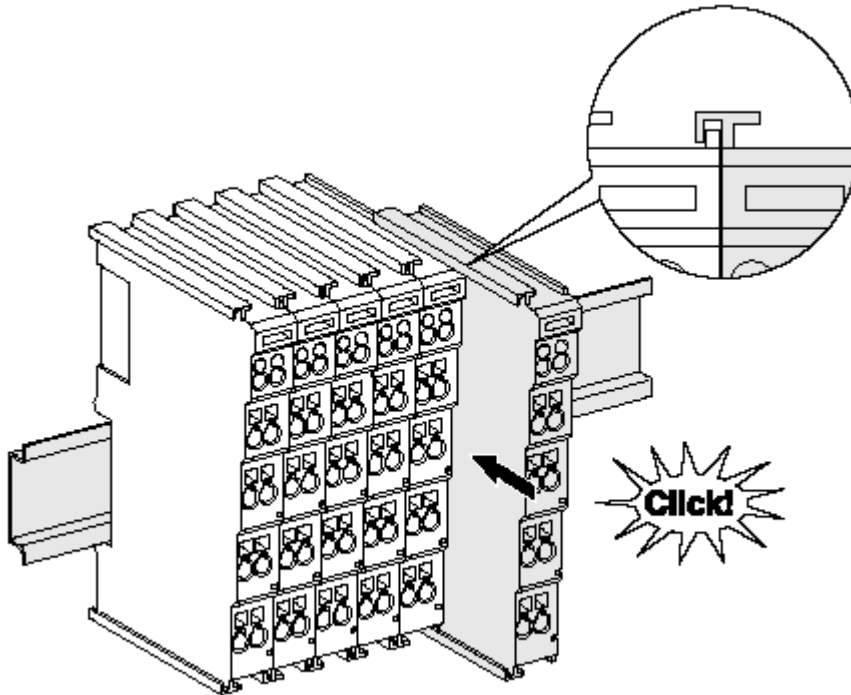
Fig. 3: Attaching on mounting rail

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

1. First attach the fieldbus coupler to the mounting rail.
2. The bus terminals are now attached on the right-hand side of the fieldbus coupler. Join the components with tongue and groove and push the terminals against the mounting rail, until the lock clicks onto the mounting rail.
   If the terminals are clipped onto the mounting rail first and then pushed together without tongue and groove, the connection will not be operational! When correctly assembled, no significant gap should be visible between the housings.

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

Disassembly
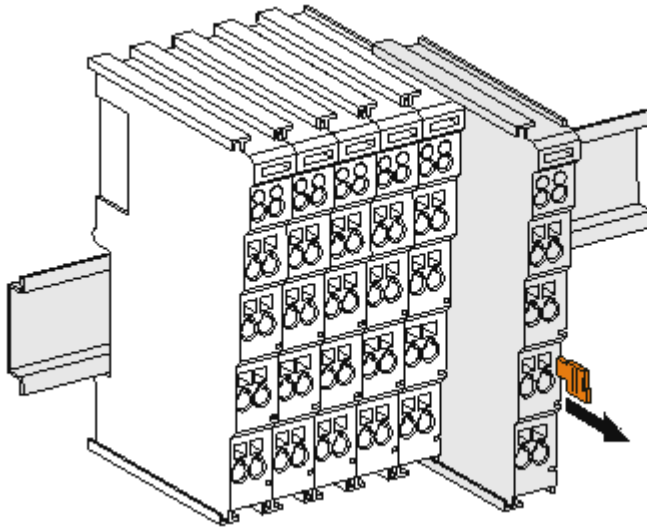
Fig. 4: Disassembling of terminal

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

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

Connections within a bus terminal block

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

• The six spring contacts of the K-Bus/E-Bus deal with the transfer of the data and the supply of the Bus Terminal electronics.

• The power contacts deal with the supply for the field electronics and thus represent a supply rail within the bus terminal block. The power contacts are supplied via terminals on the Bus Coupler (up to 24 V) or for higher voltages via power feed terminals.

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

PE power contact

The power contact labeled PE can be used as a protective earth. For safety reasons this contact mates first when plugging together, and can ground short-circuit currents of up to 125 A.
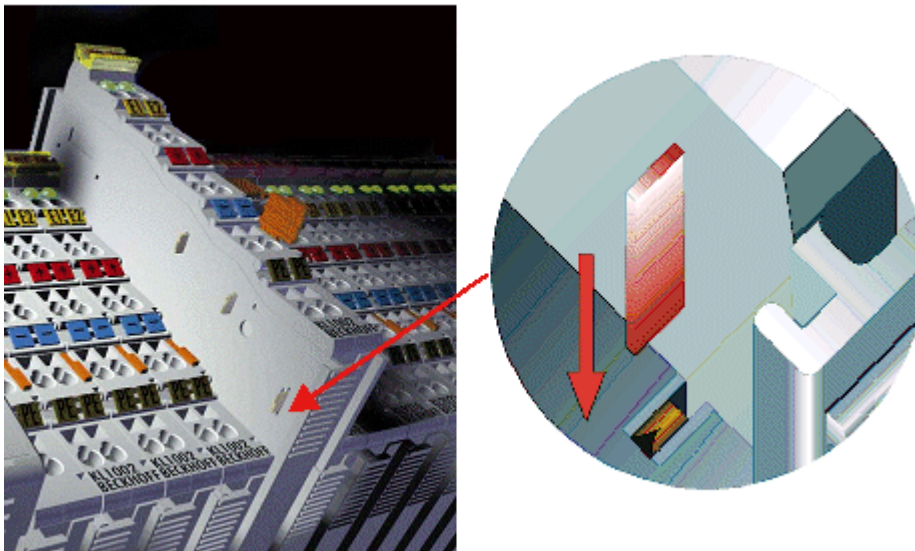
Fig. 5: Power contact on left side

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

⚠ **WARNING**
Risk of electric shock!
The PE power contact must not be used for other potentials!

3.3 Installation instructions for enhanced mechanical load capacity

⚠ 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!

Additional checks

The terminals have undergone the following additional tests:

Verification	Explanation
Vibration	10 frequency runs in 3 axes
	6 Hz < f < 60 Hz displacement 0.35 mm, constant amplitude
	60.1 Hz < f < 500 Hz acceleration 5 g, constant amplitude
Shocks	1000 shocks in each direction, in 3 axes
	25 g, 6 ms

Additional installation instructions

For terminals with enhanced mechanical load capacity, the following additional installation instructions apply:

- The enhanced mechanical load capacity is valid for all permissible installation positions
- Use a mounting rail according to EN 60715 TH35-15
- Fix the terminal segment on both sides of the mounting rail with a mechanical fixture, e.g. an earth terminal or reinforced end clamp
- The maximum total extension of the terminal segment (without coupler) is:
  64 terminals (12 mm mounting with) or 32 terminals (24 mm mounting with)
- Avoid deformation, twisting, crushing and bending of the mounting rail during edging and installation of the rail
- The mounting points of the mounting rail must be set at 5 cm intervals
- Use countersunk head screws to fasten the mounting rail
- The free length between the strain relief and the wire connection should be kept as short as possible. A distance of approx. 10 cm should be maintained to the cable duct.

3.4 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.

3.5 Connection

3.5.1 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. 6: Standard wiring

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

Pluggable wiring (ESxxxx / KSxxxx)

Fig. 7: 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 mm^2 and 2.5 mm^2 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. 8: High Density Terminals

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

ℹ **Wiring HD Terminals**

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

Ultrasonically "bonded" (ultrasonically welded) conductors

ℹ **Ultrasonically "bonded" conductors**

It is also possible to connect the Standard and High Density Terminals with ultrasonically "bonded" (ultrasonically welded) conductors. In this case, please note the tables concerning the wire-size width [▶ 17]!

3.5.2 Wiring

Terminals for standard wiring ELxxxx/KLxxxx and for pluggable wiring ESxxxx/KSxxxx
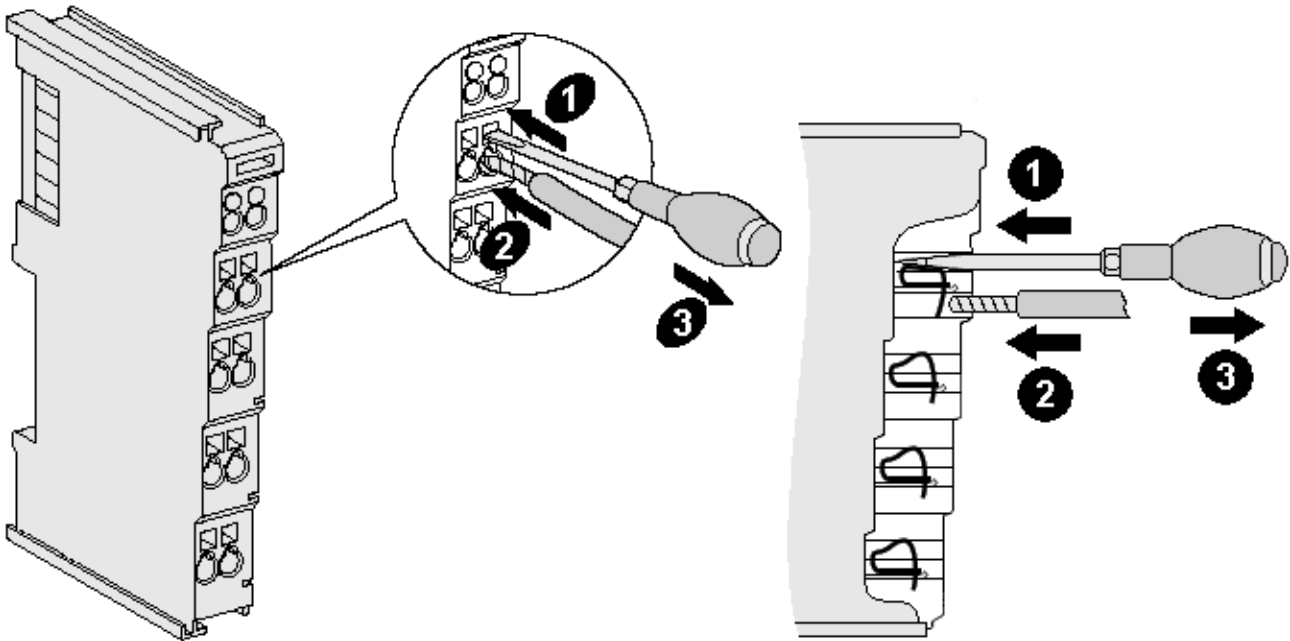
Fig. 9: Connecting a cable on a terminal point

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

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

See the following table for the suitable wire size width.

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

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

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

Terminal housing	High Density Housing
Wire size width (single core wires)	0.08 ... 1.5 mm^2
Wire size width (fine-wire conductors)	0.25 ... 1.5 mm^2
Wire size width (conductors with a wire end sleeve)	0.14 ... 0.75 mm^2
Wire size width (ultrasonically "bonded" conductors)	only 1.5 mm^2 (see notice [▶ 16])
Wire stripping length	8 ... 9 mm

3.5.3   Shielding

ℹ Shielding

Encoder, analog sensors and actors should always be connected with shielded, twisted paired wires.

3.6 Contact assignment and LEDs
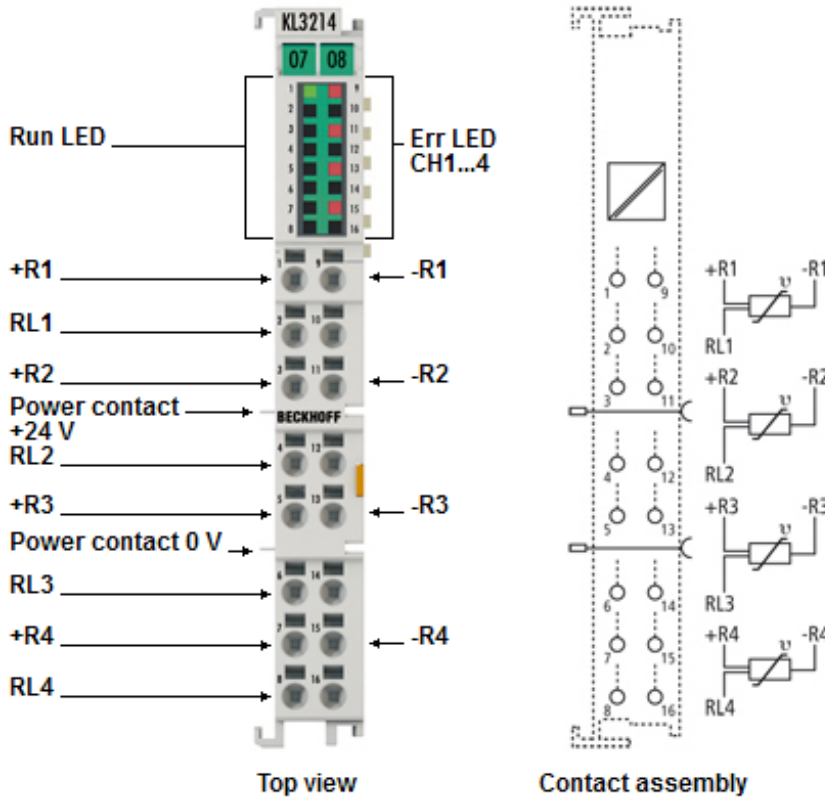
Fig. 10: KL3214 - Contact assignment and LEDs

Contact assignment

Terminal point	No.	Comment
+R1	1	Input +R1
RL1	2	Input RL1
+R2	3	Input +R2
RL2	4	Input RL2
+R3	5	Input +R3
RL3	6	Input RL3
+R4	7	Input +R4
RL4	8	Input RL4
-R1	9	Input –R1
n.c.	10	reserved
-R2	11	Input –R2
n.c.	12	reserved
-R3	13	Input -R3
n.c.	14	reserved
-R4	15	Input -R4
n.c.	16	reserved

LED displays

LED	Display	Description
Run	Green illuminated	Normal operation
	Off	Watchdog-timer overflow has occurred. If no process data is transmitted to the bus coupler for 100 ms, the green LEDs go out
Error	red illuminated	The respective channel is affected by a short circuit or broken wire. The resistance is in the invalid range of the characteristic curve.
	Off	The resistance is in the valid range of the characteristic curve.

4 KS2000 Configuration software

4.1 KS2000 - Introduction

The KS2000 configuration software permits configuration, commissioning and parameterization of bus couplers, of the affiliated bus terminals and of Fieldbus Box Modules. The connection between bus coupler / Fieldbus Box Module and the PC is established by means of the serial configuration cable or the fieldbus.

Fig. 11: KS2000 configuration software

Configuration

You can configure the Fieldbus stations with the Configuration Software KS2000 offline. That means, setting up a terminal station with all settings on the couplers and terminals resp. the Fieldbus Box Modules can be prepared before the commissioning phase. Later on, this configuration can be transferred to the terminal station in the commissioning phase by means of a download. For documentation purposes, you are provided with the breakdown of the terminal station, a parts list of modules used and a list of the parameters you have modified. After an upload, existing fieldbus stations are at your disposal for further editing.

Parameterization

KS2000 offers simple access to the parameters of a fieldbus station: specific high-level dialogs are available for all bus couplers, all intelligent bus terminals and Fieldbus Box modules with the aid of which settings can be modified easily. Alternatively, you have full access to all internal registers of the bus couplers and intelligent terminals. Refer to the register description for the meanings of the registers.

Commissioning

The KS2000 software facilitates commissioning of machine components or their fieldbus stations: Configured settings can be transferred to the fieldbus modules by means of a download. After a *login* to the terminal station, it is possible to define settings in couplers, terminals and Fieldbus Box modules directly *online*. The same high-level dialogs and register access are available for this purpose as in the configuration phase.

The KS2000 offers access to the process images of the bus couplers and Fieldbus Box modules.

- Thus, the coupler's input and output images can be observed by monitoring.
- Process values can be specified in the output image for commissioning of the output modules.

All possibilities in the *online mode* can be used in parallel with the actual fieldbus mode of the terminal station. The fieldbus protocol always has the higher priority in this case.

4.2 Parameterization with KS2000

Connect the configuration interface of your fieldbus coupler with the serial interface of your PC via the configuration cable and start the *KS2000* configuration software.

Click on the *Login* button. The configuration software will now load the information for the connected fieldbus station.

In the example shown, this is

- a BK9000 Bus Coupler for Ethernet
- a KL1xx2 digital input terminal
- a KL3214 multimeter terminal
- a KL9010 bus end terminal

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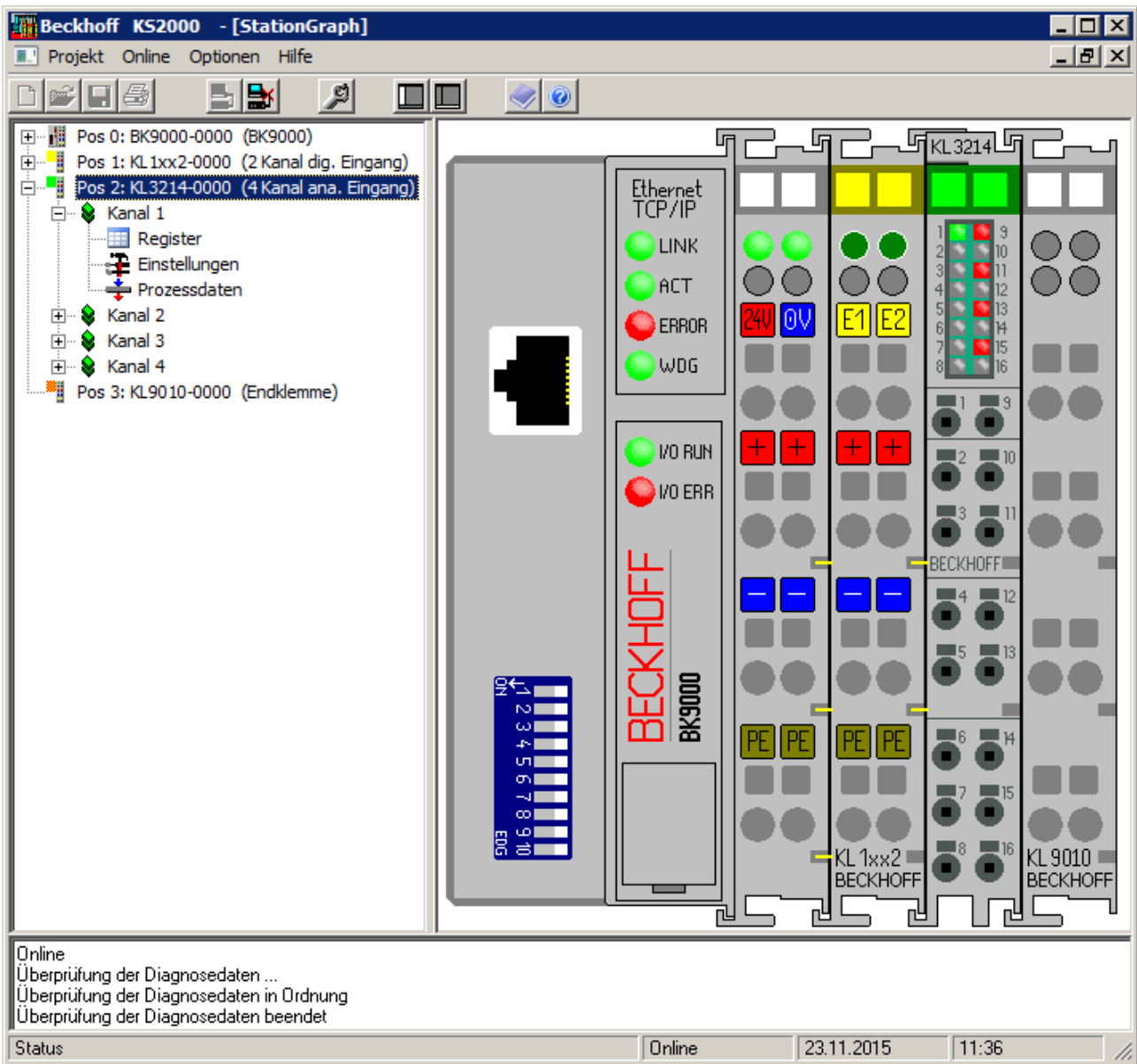
Fig. 12: Display of the fieldbus station in KS2000

The left-hand KS2000 window displays the terminals of the fieldbus station in a tree structure.
The right-hand KS2000 window contains a graphic display of the fieldbus station terminals.

In the tree structure of the left-hand window, click on the plus-sign next to the terminal whose parameters you wish to change (item 2 in the example).
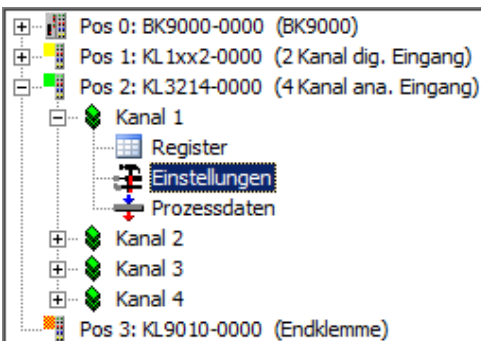
Fig. 13: KS2000 tree branch for channel 1 of the KL3214

For the KL3214, the branches *Register*, *Settings* and *ProcData* are displayed:

- Register [▶ 23] enables direct access to the KL3214 registers.
- A dialog mask for the parameterization of the KL3214 can be found under Settings [▶ 25].
- ProcData displays the KL3214 process data.

4.3 Register

You can access the registers of the KL3214 directly under *Register*.– The meaning of the register is explained in the register overview.
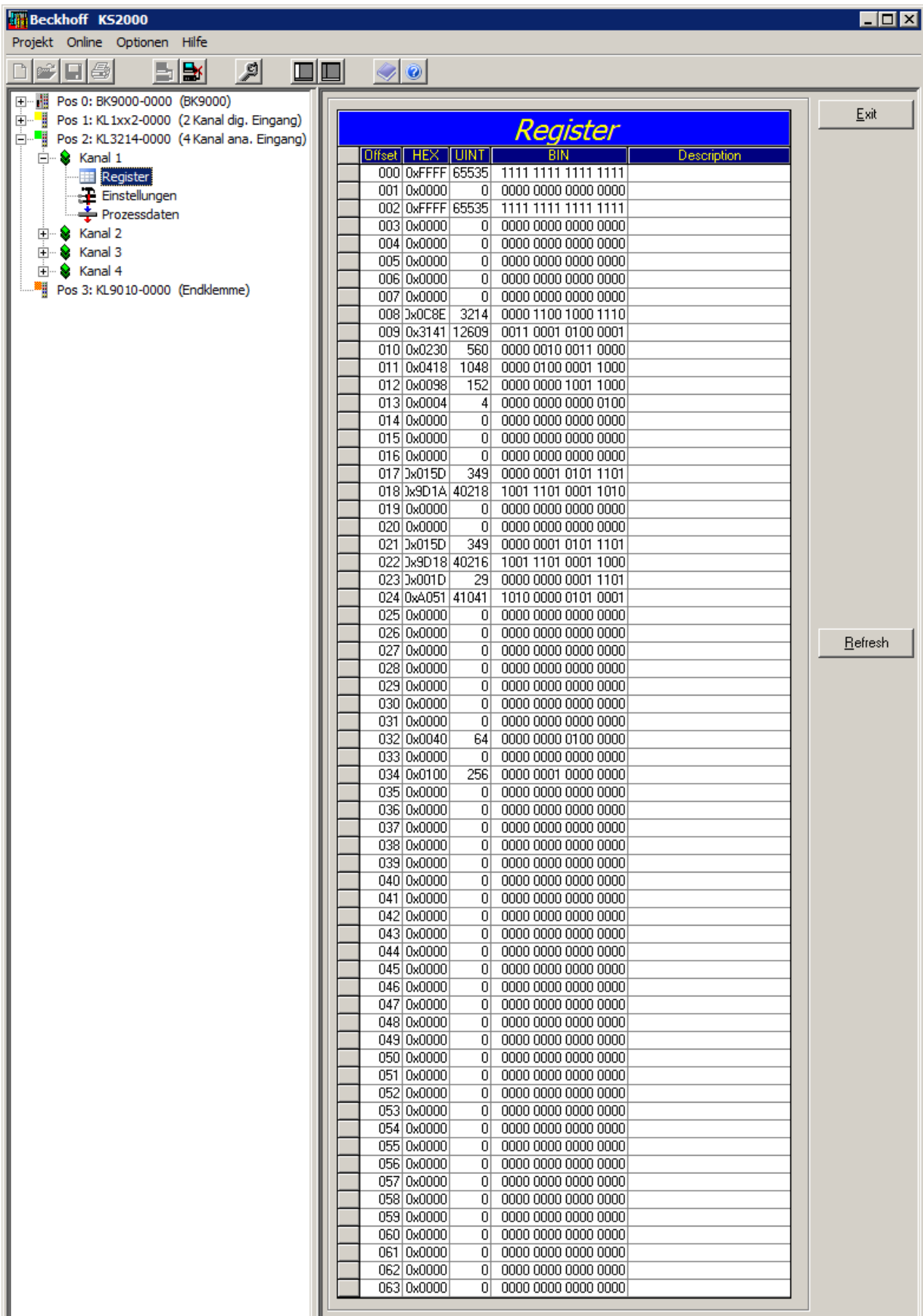
Fig. 14: Register view in KS2000

4.4   Settings

The dialog mask for the parameterization of the KL3214 can be found under *Settings*.

Fig. 15: Parameterization with the KS2000 configuration software

Operation mode

- **User scaling active (**R32.0 [▶ 34]**)**
  You can activate user scaling here (default: deactivated).

- **Watchdog timer active (**R32.2 [▶ 34]**)**
  Here you can activate the watchdog timer (default: deactivated).

- **Siemens S5 format (**R32.4 [▶ 34]**)**
  Here you can activate the Siemens S5 format (default: deactivated).

- **Resolution of 1/10 °C or 1/100 °C (**R32.5 [▶ 34]**)**
  Here you can select the resolution (default: 1/10 °C).

Filter settings (R37 [▶ 35])

Here you can set the filter frequency (default: 50 Hz).

Permissible values:
5 Hz, 10 Hz, 50 Hz, 60 Hz, 100 Hz, 500 Hz, 1000 Hz, 2000 Hz, 3750 Hz, 7500 Hz, 15000 Hz, 30000 Hz

Resistance thermometer (R32.15 to R32.8 [▶ 34])

Here you can adapt the channel to the connected thermocouple (default: PT100).

4.5 Sample program for register communication via EtherCAT on KL3314 exemplary

i **Using the sample programs**

This document contains sample applications of our products for certain areas of application. The application notes provided here are based on typical features of our products and only serve as examples. The notes contained in this document explicitly do not refer to specific applications. The customer is therefore responsible for assessing and deciding whether the product is suitable for a particular application. We accept no responsibility for the completeness and correctness of the source code contained in this document. We reserve the right to modify the content of this document at any time and accept no responsibility for errors and missing information.

Program description / function

This example program (TwinCAT 3) provides change of single register values of the KL3314 as selection of the element type, characteristical settings of the feature register R32 and user scaling offset and gain (R33/R34) similar as per KS2000.

Fig. 16: Settings of KL3314 via visualization of TwinCAT 3

At least following configuration setup shall be present:

[coupler (e.g. BK1120) or embedded PC] + KL3314 + KL9010.

💾 Download:
https://infosys.beckhoff.com/content/1033/kl3214/Resources/zip/5996114571.zip

Preparations for starting the sample programs (tnzip file / TwinCAT 3)

- Click on the download button to save the Zip archive locally on your hard disk, then unzip the *.tnzip archive file in a temporary folder.
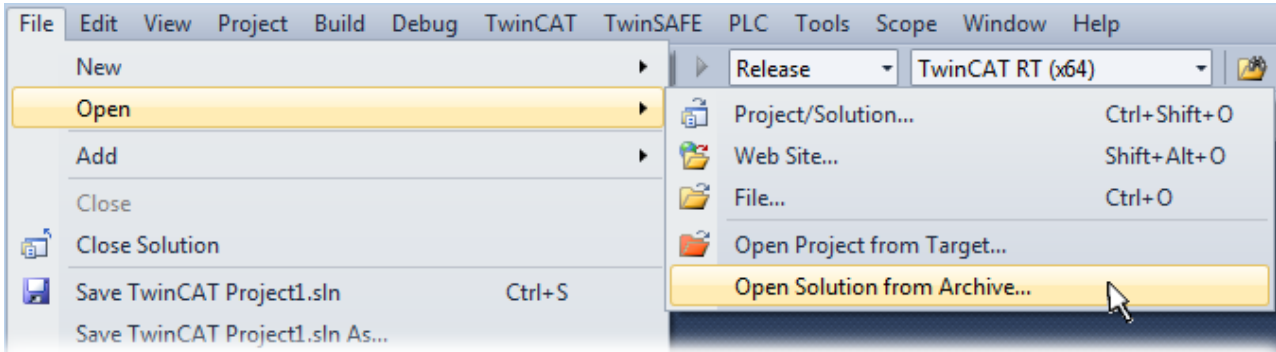
Fig. 17: Opening the *. tnzip archive

- Select the .tnzip file (sample program).
- A further selection window opens. Select the destination directory for storing the project.
- For a description of the general PLC commissioning procedure and starting the program please refer to the terminal documentation or the EtherCAT system documentation.
- The EtherCAT device of the example should usually be declared your present system. After selection of the EtherCAT device in the "Solutionexplorer" select the "Adapter" tab and click on "Search...":
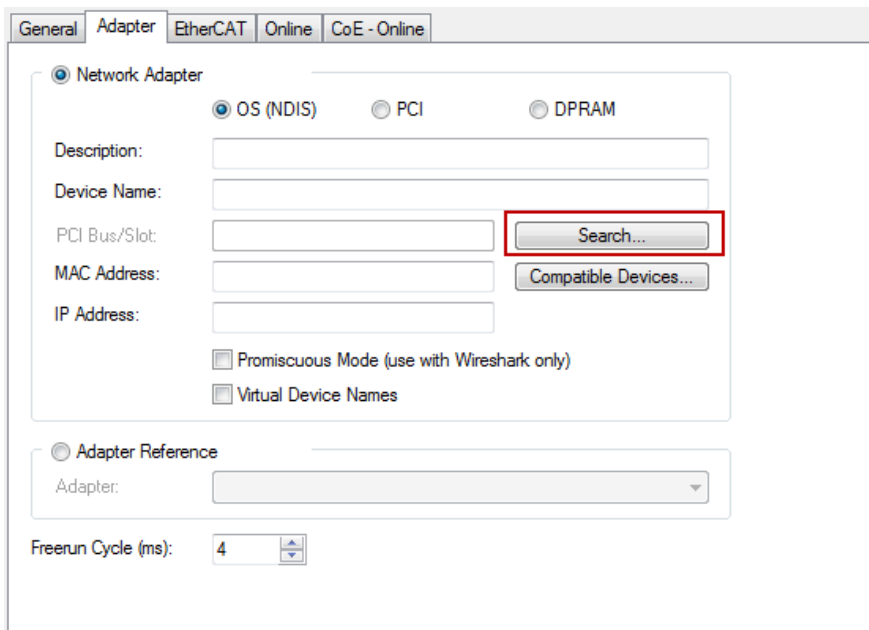
Fig. 18: Search of the existing HW configuration for the EtherCAT configuration of the example

- Checking NetId: the "EtherCAT" tab of the EtherCAT device shows the configured NetId:
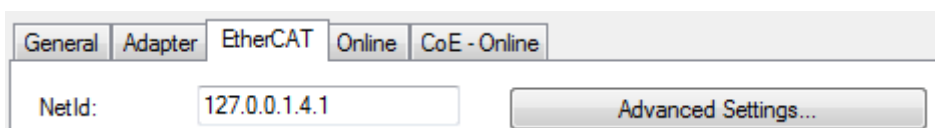
The first four numbers must be identical with the project NetId of the target system. The project NetId can be viewed within the TwinCAT environment above, where a pull down menu can be opened to choose a target system (by clicking right in the text field). The number blocks are placed in brackets there next to each computer name of a target system.

- Modify the NetId: By right clicking on "EtherCAT device" within the solution explorer a context menu opens where "Change NetId..." have to be selected. The first four numbers of the NetId of the target computer must be entered; both last values are 4.1 usually.
  Example:
    ◦ NetId of project: myComputer (123.45.67.89.1.1)
    ◦ Entry via „Change NetId...":   123.45.67.89.4.1

5 Access from the user program

Different operating modes or functionalities may be set for the complex terminals. The *General Description of Registers* explains those register contents that are the same for all complex terminals.

The terminal-specific registers are explained in the following section.

Access to the internal terminal registers is described in the *Register Communication* section.

5.1 Control and status bytes

5.1.1 Process data mode

Control byte (for process data mode)

The control byte (CB) is located in the output image, and is transmitted from the controller to the terminal.

Bit	CB.7	CB.6	CB.5	CB.4	CB.3	CB.2	CB.1	CB.0
Name	RegAccess	R/W	-	-	-	-	-	-

Bit	Name	Description	
CB.7	RegAccess	0_{bin}	Register communication off (process data mode)
CB.6	R/W	0_{bin}	Read access
		1_{bin}	Write access
CB.5	-	reserved	
CB.4	-	reserved	
CB.3	-	reserved	
CB.2	-	reserved	
CB.1	-	reserved	
CB.0	-	reserved	

Status byte (for process data mode)

The status byte (SB) is located in the input image, and is transmitted from terminal to the controller.

Bit	SB.7	SB.6	SB.5	SB.4	SB.3	SB.2	SB.1	SB.0
Name	RegAccess	Error	-	-	-	-	overrange	underrange

Bit	Name	Description	
SB.7	RegAccess	0_{bin}	Process data mode switched on
SB.6	Error	1_{bin}	Measuring range exceeded, overrange or underrange; the Error LED lights up or conversion error or invalid measuring range
SB.5	-	reserved	
SB.4	-	reserved	
SB.3	-	reserved	
SB.2	-	reserved	
SB.1	overrange	1_{bin}	Electrical measuring range exceeded
SB.0	underrange	1_{bin}	Electrical measuring range undershot

5.1.2   Register communication

Control byte (for register communication)

The control byte (CB) is located in the output image, and is transmitted from the controller to the terminal.

Bit	CB.7	CB.6	CB.5	CB.4	CB.3	CB.2	CB.1	CB.0
Name	RegAccess	R/W	Reg. no.					

Bit	Name	Description	
CB.7	RegAccess	1_{bin}	Register communication switched on
CB.6	R/W	0_{bin}	Read access
		1_{bin}	Write access
CB.5 to CB.0	Reg. no.	Register number: Enter here the number of the register that you wish • to read with input data word DataIN, or • to write with output data word DataOUT.	

Status byte (for register communication)

The status byte (SB) is located in the input image, and is transmitted from terminal to the controller.

Bit	SB.7	SB.6	SB.5	SB.4	SB.3	SB.2	SB.1	SB.0
Name	RegAccess	R/W	Reg. no.					

Bit	Name	Description	
SB.7	RegAccess	1_{bin}	Acknowledgement for register access
SB.6	R	0_{bin}	Read access
SB.5 to SB.0	Reg. no.	Number of the register that was read or written.	

5.2 Register overview

The registers are used for parametering the Bus Terminals and are available for each channel. They can be read or written by means of register communication.

Register no.	Comment	Default value		R/W	Memory
		hex	dec		
R0 [▶ 32]	Raw ADC value	variable		R	RAM
R1 [▶ 32]	ADC raw value RL (of the conductor)	variable		R	RAM
R2 [▶ 32]	Resistance RTD	variable		R	RAM
R3 [▶ 32]	Resistance RL	variable		R	RAM
R4	reserved	0x0000	0_{dec}	-	-
R5	reserved	0x0000	0_{dec}	-	-
R6	Diagnostic register (not used)	0x0000	0_{dec}	-	RAM
R7	Command register (not used)	0x0000	0_{dec}	R/W	RAM
R8 [▶ 32]	Terminal type	0x0C8E	3214_{dec}	R	ROM
R9	Firmware version number	0x3141	$1A_{ASCII}$	R	ROM
R10	Multiplex shift register	0x0230	560_{dec}	R	ROM
R11	Signal channels	0x0418	1048_{dec}	R	ROM
R12	Minimum data length	0x0098	152_{dec}	R	ROM
R13	Data structure	0x0004	4_{dec}	R	ROM
R14	reserved	0x0000	0_{dec}	-	-
R15	Alignment register	variable		R/W	RAM
R16	Hardware version number	0x0000	00_{ASCII}	R	SEEROM
R17 [▶ 33]	Vendor calibration: Offset PT100	specific		R	SEEROM
R18 [▶ 33]	Vendor calibration: Gain PT100	specific		R	SEEROM
R19	reserved	0x0000	0_{dec}	-	-
R20	reserved	0x0000	0_{dec}	-	-
R21 [▶ 33]	Vendor calibration: Offset PT1000	specific		R	SEEROM
R22 [▶ 33]	Vendor calibration: Gain PT1000	specific		R	SEEROM
R23 [▶ 33]	Vendor calibration: Offset RL	specific		R	SEEROM
R24 [▶ 33]	Vendor calibration: Gain RL	specific		R	SEEROM
R25	reserved	0x0000	0_{dec}	-	-
…	...	...	…	...	...
R28	reserved	0x0000	0_{dec}	-	-
R29	Terminal type, special identification	0x0000	0_{dec}	R	ROM
R30	reserved	0x0000	0_{dec}	-	-
R31 [▶ 33]	Code word register	0x0000	0_{dec}	R/W	RAM
R32 [▶ 34]	Feature register	0x0040	64_{dec}	R/W	SEEROM
R33 [▶ 35]	User scaling: Offset	0x0000	0_{dec}	R/W	SEEROM
R34 [▶ 35]	User scaling: Gain	0x0100	256_{dec}	R/W	SEEROM
R35	reserved	0x0000	0_{dec}	-	-
R36	reserved	0x0000	0_{dec}	-	-
R37 [▶ 35]	Filter setting	0x0000	0_{dec}	R/W	SEEROM
R38 [▶ 35]	Compensation for the line resistance	0x0000	0_{dec}	R/W	SEEROM
R39	reserved	0x0000	0_{dec}	-	-
…	...	...	…	...	...
R63	reserved	0x0000	0_{dec}	-	-

5.3 Register description

The following registers are used for parameterization of the KL3214. They can be read or written via the register communication with the aid of control, status and data bytes.

- **R0: ADC raw value RTD**
  Raw value of the A/D converter (X_R). The range is restricted to 16 bits; the three least significant bits are discarded.

- **R1: ADC raw value RL**
  Raw value of the A/D converter for the line (X_{RL}). The range is restricted to 16 bits; the three least significant bits are discarded.

- **R2: Resistance RTD**
  Resistance RTD with a resolution of 1/32 ohm with PT100 and 1/8 ohm with PT1000.

- **R3: Resistance RL**
  Resistance RL with a resolution of 1/32 ohm.

- **R6: Diagnostic register**
  The diagnostic register has no function in the KL3214.

- **R7: Command register**
  The command register has no function in the KL3214.

- **R8: Terminal description**
  Register R8 contains the designation of the KL3214 terminal: 0x0C8E (3214_{dec}).

- **R9: Firmware version**
  Register R9 contains the ASCII coding of the terminal's firmware version, e.g. **0x3141 (1A)**$_{ASCII}$. **'0x31'** corresponds to the ASCII character **'1'** and **'0x41'** to the ASCII character **'A'**. This value cannot be changed.

- **R10: Data length (multiplex shift register)**
  R10 contains the number of multiplexed shift registers and their length in bits.

- **R11: Signal channels**
  Unlike R10, this contains the number of channels that are logically present. Thus for example a shift register that is physically present can perfectly well consist of several signal channels.

- **R12: Minimum data length**
  The particular byte contains the minimum data length for a channel that is to be transferred. If the MSB is set, the control and status byte is not necessarily required for the terminal function and is not transferred to the control, if the Bus Coupler is configured accordingly.

- **R13: Data structure (data type register)**

Data type register	Meaning
0x00	Terminal with no valid data type
0x01	Byte array
0x02	Structure: 1 byte, n bytes
0x03	Word array
0x04	Structure: 1 byte, n words
0x05	Double word array
0x06	Structure: 1 byte, n double words
0x07	Structure: 1 byte, 1 double word
0x08	Structure: 1 byte, 1 double word
0x11	Byte array with variable logical channel length
0x12	Structure: 1 byte, n bytes with variable logical channel length (e.g. 60xx)
0x13	Word array with variable logical channel length
0x14	Structure: 1 byte, n words with variable logical channel length
0x15	Double word array with variable logical channel length
0x16	Structure: 1 byte, n double words with variable logical channel length

- **R15: Alignment register**
  Via the alignment register bits, the Bus Coupler arranges the address range of an analog terminal such that it starts at a byte boundary.

- **R16: Hardware version number**
  Register R16 contains the hardware revision level of the terminal; this value cannot be changed.

- **R17: Vendor calibration - offset PT100**
  This register contains the vendor calibration offset for PT100.

- **R18: Vendor calibration - gain PT100**
  This register contains the vendor calibration gain for PT100.

- **R21: Vendor calibration - offset PT1000**
  This register contains the vendor calibration offset for PT1000.

- **R22: Vendor calibration - gain PT1000**
  This register contains the vendor calibration gain for PT1000.

- **R23: Manufacturer compensation - offset RL**
  This register contains the vendor calibration offset for RL.

- **R24: vendor calibration - gain RL**
  This register contains the vendor calibration gain for RL.

- **R29: Terminal type, special version**
  Register R29 contains the special designation of the KL3214-0000 terminal: 0x0000 (0000_{dec}).

- **R31: Code word register**

  ◦ If you write values into the user registers without first entering the user code word (0x1235) into the code word register, the terminal will not accept the supplied data.

  ◦ If you write values into the user registers and have previously entered the user code word (0x1235) in the code word register, these values are stored in the RAM registers and in the SEEPROM registers and are therefore retained if the terminal is restarted.

  The code word is reset with each restart of the terminal.

- **R32: Feature register**
  The feature register specifies the terminal's configuration. Default: 0x0040 (64_{dec})

Bit	R32.15	R32.14	R32.13	R32.12	R32.11	R32.10	R32.9	R32.8
Name	SensorType							

Bit	R32.7	R32.6	R32.5	R32.4	R32.3	R32.2	R32.1	R32.0
Name	ConnectionTechnique		en1/100°C	enS5format	-	enWdTimer	-	enUserScaling

Bit	Name	Description		Default
R32.15 to R32.8	SensorType	0_{dec}	RTD PT100	0_{dec}
		1_{dec}	RTD NI100	
		2_{dec}	RTD PT1000	
		3_{dec}	RTD PT500	
		4_{dec}	RTD PT200	
		5_{dec}	RTD NI1000	
		6_{dec}	RTD NI120	
		7_{dec}	RTD RS1000	
		$8_{dec} \ldots 13_{dec}$	reserved	
		14_{dec}	RTD RES16	
		15_{dec}	RTD RES64	
		16_{dec}	RTD KTSIEMENS2K	
		17_{dec}	KTY81110	
		18_{dec}	KTY81121	
		19_{dec}	KTY81122	
		20_{dec}	KTY81151	
		21_{dec}	KTY81152	
		22_{dec}	KTY81210	
		23_{dec}	KTY81221	
		24_{dec}	KTY81222	
		25_{dec}	KTY81251	
		26_{dec}	KTY81252	
		27_{dec}	KTY83110	
		28_{dec}	KTY83121	
		29_{dec}	KTY83122	
		30_{dec}	KTY83151	
		31_{dec}	KTY83152	
		32_{dec}	KTY84130	
		33_{dec}	KTY84151	
		34_{dec}	KTSIEMENS1K	
		35_{dec}	KTSIEMENS2K_5	
		36_{dec}	KTSIEMENS2K_7	
		37_{dec}	KTSIEMENS1K_5	
		38_{dec}	KTSIEMENS1K_7	
R32.7 to R32.6	Connection technique	00_{bin}	reserved	01_{bin}
		01_{bin}	Three-wire connection technique	
		10_{bin}	reserved	
		11_{bin}	not connected	
R32.5	Resolution	0_{bin}	Resolution 1/10 °C	0_{bin}
		1_{bin}	Resolution 1/100°C	
R32.4	enS5format	0_{bin}	Siemens S5 Format disabled	0_{bin}
		1_{bin}	Siemens S5 Format enabled	
R32.3	-	reserved		0_{bin}
R32.2	enWdTimer	0_{bin}	Watchdog timer is not active	1_{bin}
		1_{bin}	Watchdog timer is active (the watchdog is triggered if no process data are received for 100 ms)	
R32.1	-	reserved		0_{bin}
R32.0	enUserScaling	0_{bin}	User scaling deactivated	0_{bin}
		1_{bin}	User scaling activated	

- **R33: user scaling offset (default: 0x0000)**
  Here you can specify the offset for the user scaling.
  Scaling: 1/10 °C (default) or 1/100 °C, see bit R32.5 of the <u>feature register [▶ 34]</u>.
  The user scaling must be activated with bit R32.0 of the feature register.

- **R34: user scaling gain (default: 0x0100)**
  Here you can specify the gain for the user scaling.
  Scaling: Register value x 2^{-8}. This means that 0x0100 (256_{dec}) corresponds to the factor 1.
  The user scaling must be activated with bit R32.0 of the feature register.

- **R37: Filter settings (default: 0x0000)**
  0x0000: 50 Hz
  0x0001: 60 Hz
  0x0002: 100 Hz
  0x0003: 500 Hz
  0x0004: 1000 Hz
  0x0005: 2000 Hz
  0x0006: 3750 Hz
  0x0007: 7500 Hz
  0x0008: 15000 Hz
  0x0009: 30000 Hz
  0x000A: 5 Hz
  0x000B: 10 Hz

- **R38: Line resistance calibration (default: 0x0000)**
  1 ohm corresponds to 32 digits.

Also see about this

📄 Register description [▶ 33]

5.4 Examples of Register Communication

The numbering of the bytes in the examples corresponds to the display without word alignment.

5.4.1 Example 1: reading the firmware version from Register 9

Output Data

Byte 0: Control byte	Byte 1: DataOUT1, high byte	Byte 2: DataOUT1, low byte
0x89 (1000 1001$_{bin}$)	0xXX	0xXX

Explanation:

- Bit 0.7 set means: Register communication switched on.
- Bit 0.6 not set means: reading the register.
- Bits 0.5 to 0.0 specify the register number 9 with 00 1001$_{bin}$.
- The output data word (byte 1 and byte 2) has no meaning during read access. To change a register, write the required value into the output word.

Input Data (answer of the Bus Terminal)

Byte 0: Status byte	Byte 1: DataIN1, high byte	Byte 2: DataIN1, low byte
0x89	0x33	0x41

Explanation:

- The terminal returns the value of the control byte as a receipt in the status byte.
- The terminal returns the firmware version 0x3341 in the input data word (byte 1 and byte 2). This is to be interpreted as an ASCII code:

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- ○ ASCII code 0x33 represents the digit 3
- ○ ASCII code 0x41 represents the letter A
  The firmware version is thus 3A.

5.4.2   Example 2: Writing to an user register

ⓘ **Code word**

In normal mode all user registers are read-only with the exception of Register 31. In order to deactivate this write protection you must write the code word (0x1235) into Register 31. If a value other than 0x1235 is written into Register 31, write protection is reactivated. Please note that changes to a register only become effective after restarting the terminal (power-off/power-on).

I. Write the code word (0x1235) into Register 31.

Output Data

Byte 0: Control byte	Byte 1: DataOUT1, high byte	Byte 2: DataOUT1, low byte
0xDF (1101 1111$_{bin}$)	0x12	0x35

Explanation:

- Bit 0.7 set means: Register communication switched on.
- Bit 0.6 set means: writing to the register.
- Bits 0.5 to 0.0 specify the register number 31 with 01 1111$_{bin}$.
- The output data word (byte 1 and byte 2) contains the code word (0x1235) for deactivating write protection.

Input Data (answer of the Bus Terminal)

Byte 0: Status byte	Byte 1: DataIN1, high byte	Byte 2: DataIN1, low byte
0x9F (1001 1111$_{bin}$)	0xXX	0xXX

Explanation:

- The terminal returns a value as a receipt in the status byte that differs only in bit 0.6 from the value of the control byte.
- The input data word (byte 1 and byte 2) is of no importance after the write access. Any values still displayed are invalid!

II. Read Register 31 (check the set code word)

Output Data

Byte 0: Control byte	Byte 1: DataOUT1, high byte	Byte 2: DataOUT1, low byte
0x9F (1001 1111$_{bin}$)	0xXX	0xXX

Explanation:

- Bit 0.7 set means: Register communication switched on.
- Bit 0.6 not set means: reading the register.
- Bits 0.5 to 0.0 specify the register number 31 with 01 1111$_{bin}$.
- The output data word (byte 1 and byte 2) has no meaning during read access.

Input Data (answer of the Bus Terminal)

Byte 0: Status byte	Byte 1: DataIN1, high byte	Byte 2: DataIN1, low byte
0x9F (1001 1111$_{bin}$)	0x12	0x35

Explanation:

- The terminal returns the value of the control byte as a receipt in the status byte.
- The terminal returns the current value of the code word register in the input data word (byte 1 and byte 2).

III. Write to Register 32 (change contents of the feature register)

Output data

Byte 0: Control byte	Byte 1: DataIN1, high byte	Byte 2: DataIN1, low byte
0xE0 (1110 0000$_{bin}$)	0x00	0x02

Explanation:

- Bit 0.7 set means: Register communication switched on.
- Bit 0.6 set means: writing to the register.
- Bits 0.5 to 0.0 indicate register number 32 with 10 0000$_{bin}$.
- The output data word (byte 1 and byte 2) contains the new value for the feature register.

⚠ **CAUTION**
Observe the register description!
The value of 0x0002 given here is just an example! The bits of the feature register change the properties of the terminal and have a different meaning, depending on the type of terminal. Refer to the description of the feature register of your terminal (chapter *Register description*) regarding the meaning of the individual bits before changing the values.

Input data (response from the Bus Terminal)

Byte 0: Status byte	Byte 1: DataIN1, high byte	Byte 2: DataIN1, low byte
0xA0 (1010 0000$_{bin}$)	0xXX	0xXX

Explanation:

- The terminal returns a value as a receipt in the status byte that differs only in bit 0.6 from the value of the control byte.
- The input data word (byte 1 and byte 2) is of no importance after the write access. Any values still displayed are invalid!

IV. Read Register 32 (check changed feature register)

Output Data

Byte 0: Control byte	Byte 1: DataOUT1, high byte	Byte 2: DataOUT1, low byte
0xA0 (1010 0000$_{bin}$)	0xXX	0xXX

Explanation:

- Bit 0.7 set means: Register communication switched on.
- Bit 0.6 not set means: reading the register.
- Bits 0.5 to 0.0 indicate register number 32 with 10 0000$_{bin}$.
- The output data word (byte 1 and byte 2) has no meaning during read access.

Input Data (answer of the Bus Terminal)

Byte 0: Status byte	Byte 1: DataIN1, high byte	Byte 2: DataIN1, low byte
0xA0 (1010 0000$_{bin}$)	0x00	0x02

Explanation:

- The terminal returns the value of the control byte as a receipt in the status byte.
- The terminal returns the current value of the feature register in the input data word (byte 1 and byte 2).

V. Write Register 31 (reset code word)

Output Data

Byte 0: Control byte	Byte 1: DataOUT1, high byte	Byte 2: DataOUT1, low byte
0xDF (1101 1111$_{bin}$)	0x00	0x00

Explanation:

- Bit 0.7 set means: Register communication switched on.
- Bit 0.6 set means: writing to the register.
- Bits 0.5 to 0.0 specify the register number 31 with 01 1111$_{bin}$.
- The output data word (byte 1 and byte 2) contains 0x0000 for reactivating write protection.

Input Data (answer of the Bus Terminal)

Byte 0: Status byte	Byte 1: DataIN1, high byte	Byte 2: DataIN1, low byte
0x9F (1001 1111$_{bin}$)	0xXX	0xXX

Explanation:

- The terminal returns a value as a receipt in the status byte that differs only in bit 0.6 from the value of the control byte.
- The input data word (byte 1 and byte 2) is of no importance after the write access. Any values still displayed are invalid!

5.5   Process image

Complex mapping

The following 12 bytes are transferred bi-directionally between KL3214 and control:

Byte offset (without word alignment*)	Byte offset (with word alignment*)	Format	Input data	Output data
0	0	Byte	Status byte 0 (SB0)	Control byte 0 (CB0)
1	2	Word	DataIN0	DataOUT0
3	4	Byte	Status byte 1 (SB1)	Control byte 1 (CB1)
4	6	Word	DataIN1	DataOUT1
6	8	Byte	Status byte 2 (SB2)	Control byte 2 (CB2)
7	10	Word	DataIN2	DataOUT2
9	12	Byte	Status byte 3 (SB3)	Control byte 3 (CB3)
10	14	Word	DataIN3	DataOUT3

*) Word alignment: The Bus Coupler places values on even byte addresses

Compact mapping

The following 8 bytes are transmitted bidirectionally between KL3414 and controller:

Byte offset (with and without word alignment*)	Format	Input data	Output data
0	Word	DataIN0	DataOUT0
2	Word	DataIN1	DataOUT1
4	Word	DataIN2	DataOUT2
6	Word	DataIN3	DataOUT3

*) word alignment has no effect with compact mapping

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5.6 Mapping

Each Bus Terminal is mapped in the Bus Coupler. In the delivery state, this mapping occurs with the default settings of the Bus Coupler for this terminal. The default setting can be changed with the KS2000 configuration software or with a master configuration software (e.g. TwinCAT System Manager or ComProfibus).

If the terminals are complexly evaluated, they occupy memory space in the input and output process image.

The following tables provide information about the terminal mapping, depending on the conditions set in the Bus Coupler.

Default mapping for:

Lightbus, EtherCAT, Ethernet and Bus Terminal Controller (BCxxxx, BXxxxx)

Conditions	Word offset	High byte	Low byte
Complex evaluation: yes	0	reserved	Ch0 CB/SB
Motorola format: no	1	Ch0 D1	Ch0 D0
Word alignment: yes	2	r reserved	Ch1 CB/SB
	3	Ch1 D1	Ch1 D0

Conditions	Word offset	High byte	Low byte
Complex evaluation: yes	0	reserved	Ch0 CB/SB
Motorola format: yes	1	Ch0 D0	Ch0 D1
Word alignment: yes	2	reserved	Ch1 CB/SB
	3	Ch1 D0	Ch1 D1

Key

- Complex evaluation:
  The terminal is mapped with control and status byte.

- Motorola format:
  Motorola or Intel format can be set.

- Word alignment:
  The terminal is at word limit in the Bus Coupler.

- Ch n SB:
  status byte for channel n (appears in the input process image).

- Ch n CB:
  control byte for channel n (appears in the output process image).

- Ch n D0:
  channel n, data byte 0 (byte with the lowest value)

- Ch n D1:
  channel n, data byte 1 (byte with the highest value)

- reserved:
  This byte occupies process data memory, although it is not used.

- "-":
  This byte is not used or occupied by the terminal.

Default mapping for:
PROFIBUS, Interbus

Conditions	Word offset	High byte	Low byte
Complex evaluation: no	0	Ch0 D0	Ch0 D1
Motorola format: yes	1	Ch1 D0	Ch1 D1
Word alignment: don't care	2	Ch2 D0	Ch2 D1
	3	Ch3 D0	Ch3 D1

Conditions	Word offset	High byte	Low byte
Complex evaluation: yes	0	Ch0 D0	Ch0 CB/SB
Motorola format: no	1	Ch1 CB/SB	Ch0 D1
Word alignment: no	2	Ch1 D1	Ch1 D0
	3	Ch2 D0	Ch2 CB/SB
	4	Ch3 CB/SB	Ch2 D1
	5	Ch3 D1	Ch3 D0

Conditions	Word offset	High byte	Low byte
Complex evaluation: yes	0	Ch0 D1	Ch0 CB/SB
Motorola format: yes	1	Ch1 CB/SB	Ch0 D0
Word alignment: no	2	Ch1 D0	Ch1 D1
	3	Ch2 D1	Ch2 CB/SB
	4	Ch3 CB/SB	Ch2 D0
	5	Ch3 D0	Ch3 D1

Default mapping for:
CANopen, CANCAL, DeviceNet, ControlNet, Modbus, RS232, RS485

Conditions	Word offset	High byte	Low byte
Complex evaluation: no	0	Ch0 D1	Ch0 D0
Motorola format: no	1	Ch1 D1	Ch1 D0
Word alignment: don't care	2	Ch2 D1	Ch2 D0
	3	Ch3 D1	Ch3 D0

6   Appendix

6.1   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.
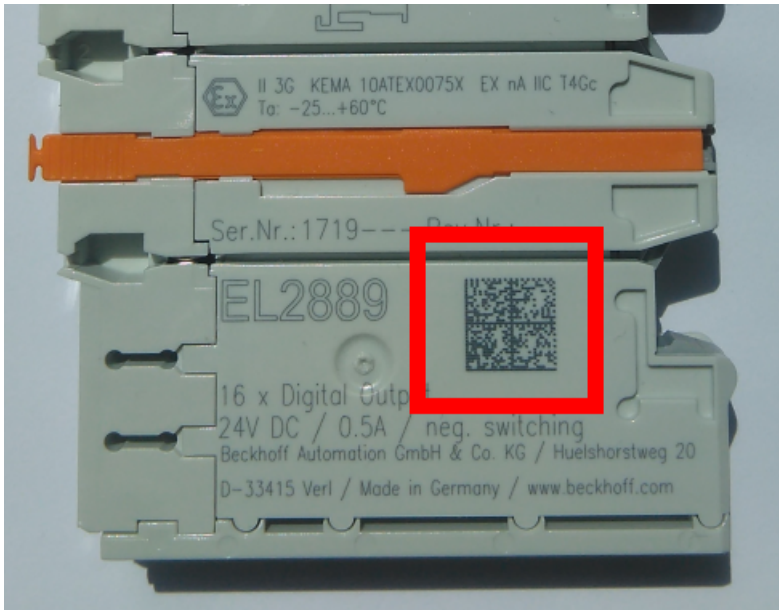

Fig. 19: BIC as data matrix code (DMC, code scheme ECC200)

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.

Following information is possible, positions 1 to 4 are always present, the other according to need of production:

Posi-tion	Type of information	Explanation	Data identifier	Number of digits incl. data identifier	Example
1	Beckhoff order number	**Beckhoff order number**	1P	8	1P072222
2	Beckhoff Traceability Number (BTN**)**	**Unique serial number, see note below**	SBTN	12	SBTNk4p562d7
3	Article description	**Beckhoff article description, e.g. EL1008**	1K	32	1KEL1809
4	Quantity	**Quantity in packaging unit, e.g. 1, 10, etc.**	Q	6	Q1
5	Batch number	Optional: Year and week of production	2P	14	2P401503180016
6	ID/serial number	Optional: Present-day serial number system, e.g. with safety products	51S	12	51S678294
7	Variant number	Optional: Product variant number on the basis of standard products	30P	32	30PF971, 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 positions 1 to 4 and with the above given example value on position 6. The data identifiers are highlighted in bold font:

1P072222**S**BTNk4p562d7**1K**EL1809 **Q**1 **51S**678294

Accordingly as DMC:

Fig. 20: Example DMC **1P**072222**S**BTNk4p562d7**1K**EL1809 **Q**1 **51S**678294

BTN

An important component of the BIC is the Beckhoff Traceability Number (BTN, position 2). The BTN is a unique serial number consisting of eight characters that will replace all other serial number systems at Beckhoff in the long term (e.g. batch designations on IO components, previous serial number range for safety products, etc.). The BTN will also be introduced step by step, so it may happen that the BTN is not yet coded in the BIC.

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

6.2   Support and Service

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

Beckhoff's branch offices and representatives

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

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

You will also find further documentation for Beckhoff components there.

Beckhoff Support

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

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

Hotline: +49 5246 963 157
Fax: +49 5246 963 9157
e-mail: support@beckhoff.com

Beckhoff Service

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

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

Hotline: +49 5246 963 460
Fax: +49 5246 963 479
e-mail: service@beckhoff.com

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