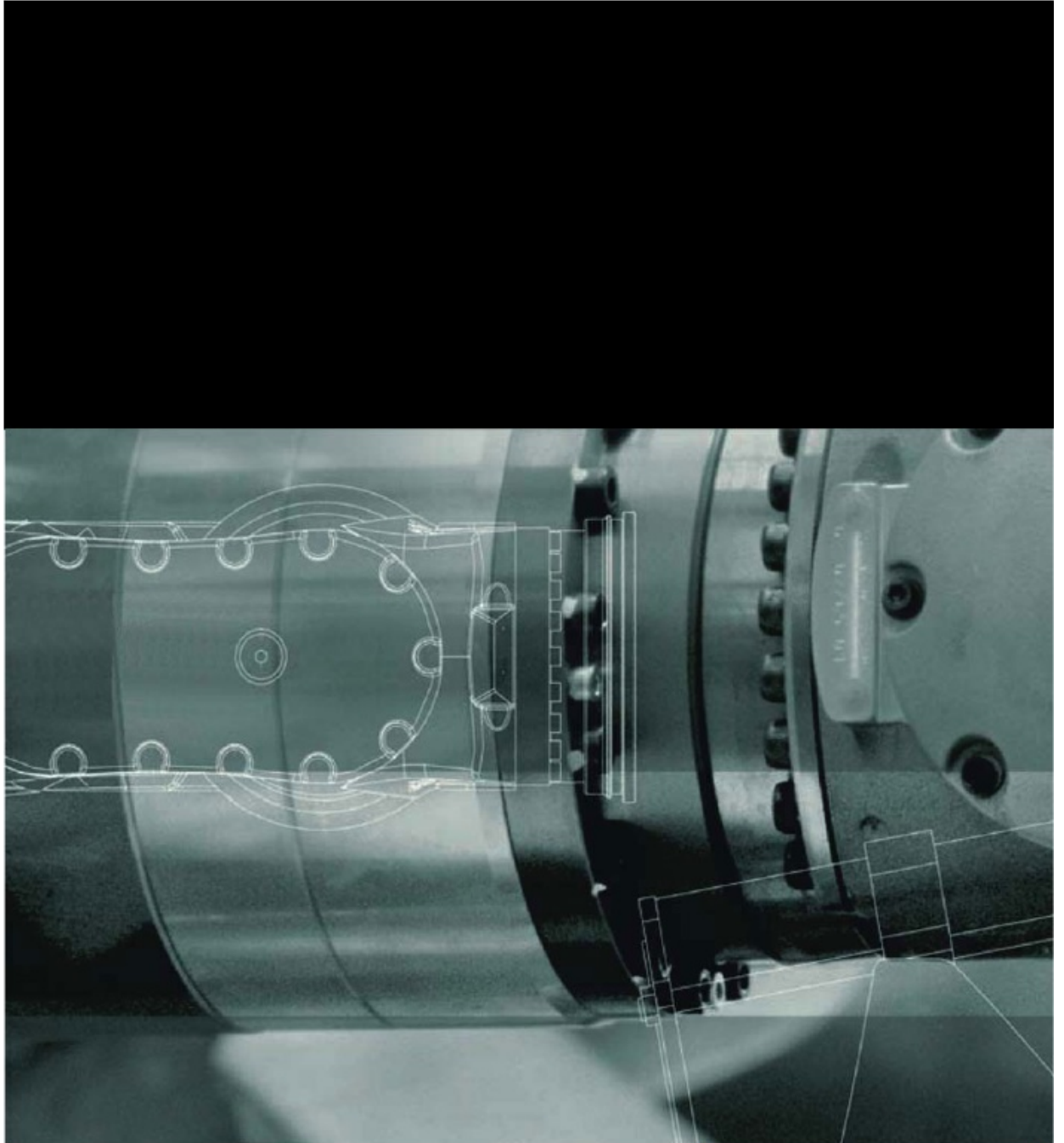


# KUKA



Issued: 21.01.2014

Version: KR C4 EtherCAT Bridge V1



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Other functions not described in this documentation may be operable in the controller. The user has no claims to these functions, however, in the case of a replacement or service work.

We have checked the content of this documentation for conformity with the hardware and software described. Nevertheless, discrepancies cannot be precluded, for which reason we are not able to guarantee total conformity. The information in this documentation is checked on a regular basis, however, and necessary corrections will be incorporated in the subsequent edition.

Subject to technical alterations without an effect on the function.

Translation of the original documentation

KIM-PS5-DOC

Publication:	Pub KR C4 EtherCAT Bridge (PDF) en
Book structure:	KR C4 EtherCAT Bridge V1.1
Version:	KR C4 EtherCAT Bridge V1

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# 1 Introduction

## 1.1 Target group

This documentation is aimed at users with the following knowledge and skills:

- Advanced KRL programming skills
- Advanced knowledge of the robot controller system
- Advanced knowledge of field buses
- Knowledge of WorkVisual

## 1.2 Industrial robot documentation

The industrial robot documentation consists of the following parts:


- Documentation for the manipulator
- Documentation for the robot controller
- Operating and programming instructions for the System Software
- Instructions for options and accessories
- Parts catalog on storage medium


Each of these sets of instructions is a separate document.


## 1.3 Representation of warnings and notes


### Safety


These warnings are relevant to safety and **must** be observed.

 **DANGER** These warnings mean that it is certain or highly probable that death or severe injuries **will** occur, if no precautions are taken.


 **WARNING** These warnings mean that death or severe injuries **may** occur, if no precautions are taken.

 **CAUTION** These warnings mean that minor injuries **may** occur, if no precautions are taken.

 **NOTICE** These warnings mean that damage to property **may** occur, if no precautions are taken.


 These warnings contain references to safety-relevant information or general safety measures.  
These warnings do not refer to individual hazards or individual precautionary measures.

This warning draws attention to procedures which serve to prevent or remedy emergencies or malfunctions:

 **SAFETY INSTRUCTIONS** Procedures marked with this warning **must** be followed exactly.

### Notes

These hints serve to make your work easier or contain references to further information.

 Tip to make your work easier or reference to further information.

## 1.4 Trademarks



is a trademark of Beckhoff Automation GmbH.

## 1.5 Terms used

Term	Description
PLC	Programmable logic controller
WorkVisual	Configuration software from KUKA for field bus configuration

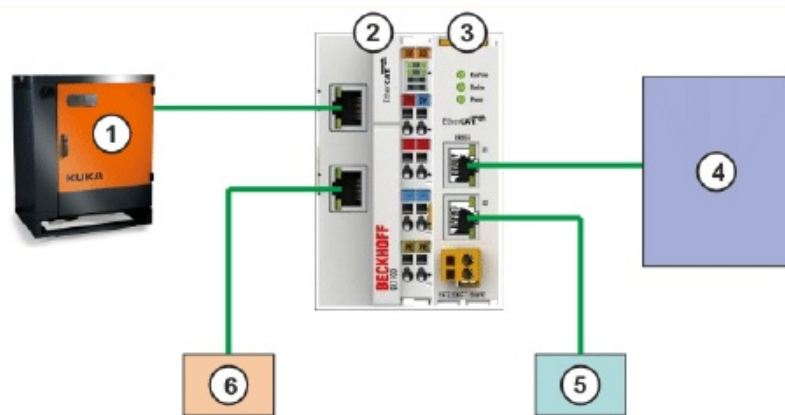
## 2 Product description

### 2.1 Overview of EtherCAT bridge

EtherCAT bridge can be used to establish communication between an external controller (i.e. PLC) and a KR C4 if both controllers are configured as master in their bus line.

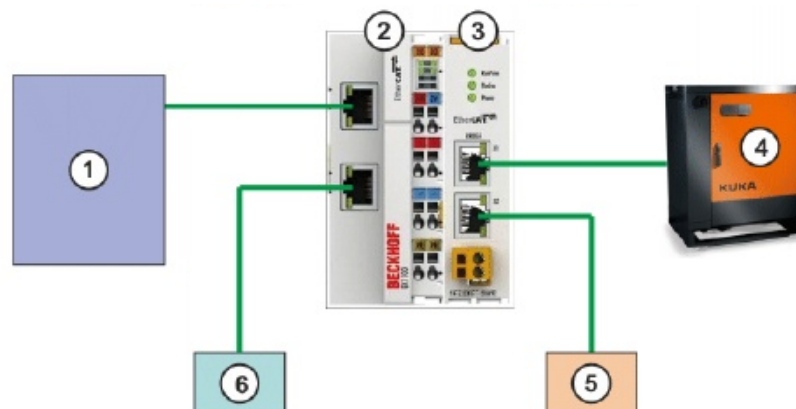
To make this possible, EtherCAT bridge must be configured as a slave on both sides. EtherCAT bridge forwards the received data from one line to the other. This enables the exchange of large amounts of data at the bus clock rate.

EtherCAT bridge consists of a bus coupler and the EtherCAT bridge terminal. The controller connected to the bus coupler is the primary controller. The controller connected to the bridge terminal is the secondary controller. Which controller is configured as primary or secondary depends on which bus line the bridge terminal is mounted on.



**Fig. 2-1: KR C4 as the primary controller**

- 1 KR C4 (primary controller)
- 2 Bus coupler (here: EK1100)
- 3 Bridge terminal EL6692
- 4 External controller (secondary controller)
- 5 EtherCAT device on the external controller
- 6 EtherCAT device on the KR C4



**Fig. 2-2: Third-party controller as the primary controller**

- 1 External controller (primary controller)
- 2 Bus coupler (here: EK1100)

- 3 Bridge terminal EL6692
- 4 KR C4 (secondary controller)
- 5 EtherCAT device on the KR C4
- 6 EtherCAT device on the external controller

**Configuration software**

EtherCAT bridge is configured on a laptop or PC. The following software is required for configuration:

- WorkVisual 3.1

The requirements for installation of WorkVisual are contained in the WorkVisual documentation.



### 3 Safety

This documentation contains safety instructions which refer specifically to the product described here. The fundamental safety information for the industrial robot can be found in the “Safety” chapter of the operating or assembly instructions for the robot controller.

**WARNING**

The “Safety” chapter in the operating instructions or assembly instructions of the robot controller must be observed. Death to persons, severe injuries or considerable damage to property may otherwise result.



## 4 Configuration

### 4.1 Overview

The configuration depends on whether the KR C4 is to be configured as the primary or secondary controller:

- KR C4 as the primary controller  
(>>> 4.2 "Configuring the KR C4 as the primary controller" Page 11)
- KR C4 as the secondary controller  
(>>> 4.3 "Configuring the KR C4 as the secondary controller" Page 11)



Information about procedures in WorkVisual is contained in the WorkVisual documentation. Information about procedures in the configuration software from the manufacturer of the higher-level controller can be found in the documentation for this configuration software.

### 4.2 Configuring the KR C4 as the primary controller

**Precondition** ■ A robot controller has been added and set as active.

- Procedure**
1. Expand the tree structure of the robot controller on the **Hardware** tab in the **Project structure** window.
  2. Right-click on **Bus structure** and select **Add...** from the context menu.
  3. A window opens. Select the entry **KUKA Extension Bus (SYS-X44)** and confirm with **OK**. The entry is inserted in the tree structure.
  4. Expand the tree structure as far as possible. Right-click on **EtherCAT** and select **Add...** from the context menu.
  5. A window opens. Select a bus coupler, e.g. **EK1100 EtherCAT coupler (2A E-Bus)**, and confirm with **OK**. The bus coupler is inserted in the tree structure.
  6. Expand the tree structure as far as possible. Right-click on **EBus** and select **Add...** from the context menu.
  7. A window opens. Select the entry **EL6692 EtherCAT bridge terminal (primary)** and confirm with **OK**. The terminal is inserted in the tree structure.
  8. Right-click on the terminal and select **Settings...** from the context menu. A window opens with the settings.
  9. Enter the number of inputs and outputs on the **Slave settings** tab.  
(>>> 4.4 "Slave settings" tab" Page 12)
  10. Save the settings by selecting **OK**.

### 4.3 Configuring the KR C4 as the secondary controller

**Precondition** ■ A robot controller has been added and set as active.

- Procedure**
1. Expand the tree structure of the robot controller on the **Hardware** tab in the **Project structure** window.
  2. Right-click on **Bus structure** and select **Add...** from the context menu.
  3. A window opens. Select the entry **KUKA Extension Bus (SYS-X44)** and confirm with **OK**. The entry is inserted in the tree structure.
  4. Expand the tree structure as far as possible. Right-click on **EtherCAT** and select **Add...** from the context menu.

5. A window opens. Select the entry **EL6692 EtherCAT bridge terminal (secondary)** and confirm with **OK**. The terminal is inserted in the tree structure.
6. Right-click on the terminal and select **Settings...** from the context menu. A window opens with the settings.
7. Enter the number of inputs and outputs on the **Slave settings** tab, inversely matching the settings for the primary terminal.  
(>>> 4.4 "Slave settings" tab" Page 12)
8. Save the settings by selecting **OK**.

#### 4.4 "Slave settings" tab

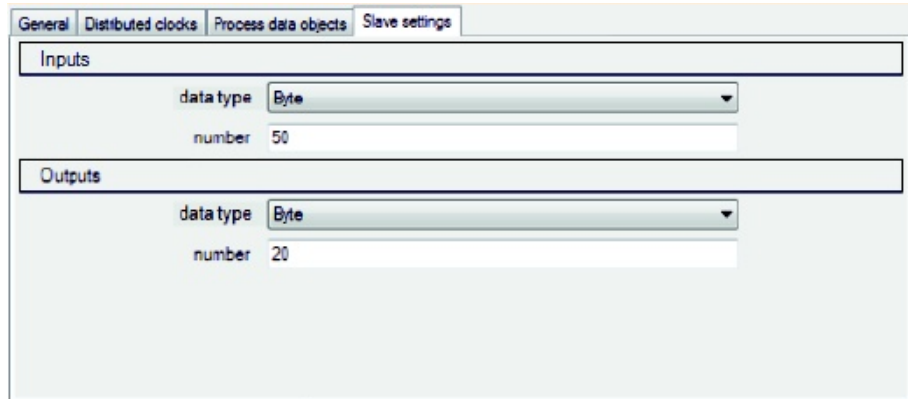


Fig. 4-1: "Slave settings" tab

Box	Description
Inputs	
Data type	Select the data type of the inputs. <ul style="list-style-type: none"> <li>■ <b>Bit</b></li> <li>■ <b>Byte</b></li> <li>■ <b>Word</b></li> <li>■ <b>DWord</b></li> <li>■ <b>LWord</b></li> </ul> <b>Note:</b> The selected data type is displayed in the mapping editor.
Number	Enter the number of inputs. <ul style="list-style-type: none"> <li>■ <b>0 ... 59</b></li> </ul> <b>Note:</b> For the <b>Bit</b> data type, the number must be divisible by 8.
Outputs	


Box	Description
Data type	<p>Select the data type of the outputs.</p> <ul style="list-style-type: none"><li>■ <b>Bit</b></li><li>■ <b>Byte</b></li><li>■ <b>Word</b></li><li>■ <b>DWord</b></li><li>■ <b>LWord</b></li></ul> <p><b>Note:</b> The selected data type is displayed in the mapping editor.</p>
Number	<p>Enter the number of outputs.</p> <ul style="list-style-type: none"><li>■ <b>0 ... 59</b></li></ul> <p><b>Note:</b> For the <b>Bit</b> data type, the number must be divisible by 8.</p>



## 5 Diagnosis

### 5.1 Diagnosing the state

The state of the opposite bus line can be diagnosed with the signal **SYNC Inputs External device not connected**.

 In the event of an error on the opposite bus line, the motion enable command is not canceled!

#### Procedure

- The signal **SYNC Inputs External device not connected** is mapped to an output. The value that is returned at the output provides information regarding the state of the opposite bus line:

Return value	Description
TRUE	The opposite bus line has an error.
FALSE	The opposite bus line is OK.





## 6 KUKA Service

### 6.1 Requesting support

<b>Introduction</b>	This documentation provides information on operation and operator control, and provides assistance with troubleshooting. For further assistance, please contact your local KUKA subsidiary.
<b>Info</b>	<p>The following information is required for processing a support request:</p> <ul style="list-style-type: none"> <li>■ Model and serial number of the manipulator</li> <li>■ Model and serial number of the controller</li> <li>■ Model and serial number of the linear unit (if present)</li> <li>■ Model and serial number of the energy supply system (if present)</li> <li>■ Version of the system software</li> <li>■ Optional software or modifications</li> <li>■ Diagnostic package <b>KrcDiag</b>:            Additionally for KUKA Sunrise: Existing projects including applications            For versions of KUKA System Software older than V8: Archive of the software (<b>KrcDiag</b> is not yet available here.)</li> <li>■ Application used</li> <li>■ External axes used</li> <li>■ Description of the problem, duration and frequency of the fault</li> </ul>

### 6.2 KUKA Customer Support

<b>Availability</b>	KUKA Customer Support is available in many countries. Please do not hesitate to contact us if you have any questions.
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<b>Australia</b>	<p>Headland Machinery Pty. Ltd.          Victoria (Head Office &amp; Showroom)          95 Highbury Road          Burwood          Victoria 31 25          Australia          Tel. +61 3 9244-3500          Fax +61 3 9244-3501  <a href="mailto:vic@headland.com.au">vic@headland.com.au</a>  <a href="http://www.headland.com.au">www.headland.com.au</a></p>

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