

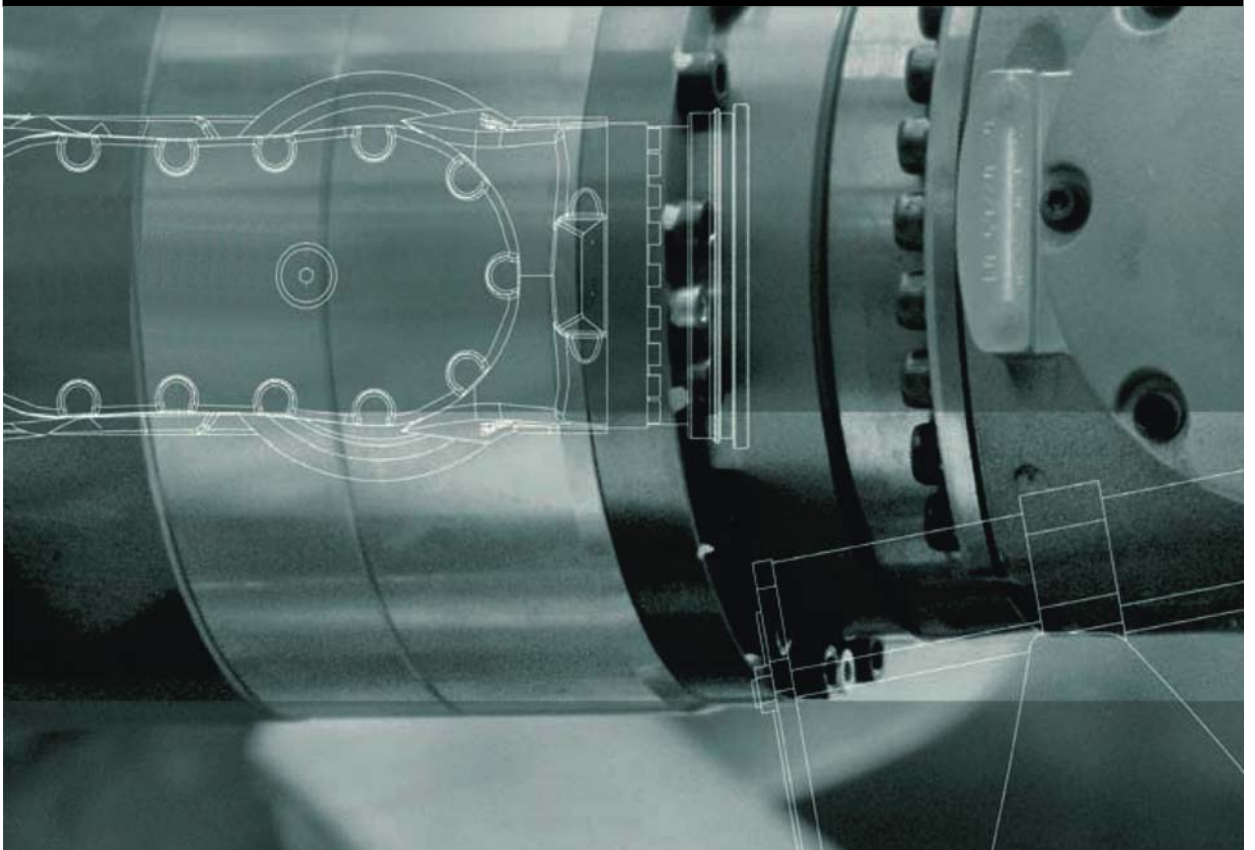


**Controller Option**

KUKA Roboter GmbH

## **KR C4 PROFIBUS**

**Configuration**



Issued: 24.01.2011

Version: KR C4 PROFIBUS V1 en



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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 PROFIBUS en
Bookstructure:	KR C4 PROFIBUS V1.2
Label:	KR C4 PROFIBUS V1 en

## Contents

<b>1</b>	<b>Introduction .....</b>	<b>5</b>
1.1	Target group .....	5
1.2	Industrial robot documentation .....	5
1.3	Representation of warnings and notes .....	5
1.4	Trade mark .....	5
1.5	Terms used .....	6
<b>2</b>	<b>Product description .....</b>	<b>7</b>
<b>3</b>	<b>Safety .....</b>	<b>11</b>
<b>4</b>	<b>Start-up and recommissioning .....</b>	<b>13</b>
4.1	Routing the data cables .....	13
<b>5</b>	<b>Configuration .....</b>	<b>15</b>
5.1	Overview .....	15
5.2	Making GSD files available .....	15
5.3	Configuring the bus with WorkVisual .....	15
5.3.1	Configuring the PROFIBUS master .....	16
5.3.2	Configuring a PROFIBUS slave .....	16
5.3.3	Device settings .....	17
5.4	Setting the device address in WorkVisual .....	18
5.4.1	Settings for PROFIBUS master .....	18
5.4.2	Settings for PROFIBUS slave .....	19
5.5	Mapping inputs/outputs in WorkVisual .....	19
<b>6</b>	<b>Operation .....</b>	<b>21</b>
6.1	Coupling/decoupling devices .....	21
6.2	Executing queries / changes .....	22
<b>7</b>	<b>Diagnosis .....</b>	<b>25</b>
7.1	Displaying diagnostic data .....	25
<b>8</b>	<b>Messages .....</b>	<b>27</b>
<b>9</b>	<b>KUKA Service .....</b>	<b>29</b>
9.1	Requesting support .....	29
9.2	KUKA Customer Support .....	29
	<b>Index .....</b>	<b>37</b>



# 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 KUKA System Software
- Documentation relating to 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 death or severe physical injury **will** occur, if no precautions are taken.

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


 **CAUTION** These warnings mean that minor physical 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.

### Hints

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 Trade mark

**Windows** is a trade mark of Microsoft Corporation.

**Step 7** is a trademark of Siemens AG.

## 1.5 Terms used

Term	Description
GSD	Device description file for PROFIBUS
PLC	Programmable logic controller
Step 7	Configuration software from Siemens

## 2 Product description

PROFIBUS is a universal field bus which enables communication between devices from different manufacturers without special interface adaptations. Data exchange is carried out on a master-slave basis.

### Variants

For the KR C4 there are 3 different variants of PROFIBUS:

- PROFIBUS Controller (Master) - EtherCAT
- PROFIBUS Device (Slave) - EtherCAT
- PROFIBUS Controller/Device - EtherCAT

The KUKA System Software 8.2 is preinstalled on all 3 variants.

### Expansion

KR C4 PROFIBUS can be combined with the “Expansion of Digital I/Os 16/16” option, but not with other expansion options for digital inputs/outputs.

### Configuration

KR C4 PROFIBUS is configured on a laptop or PC. The following software is required for configuration:

- WorkVisual 2.0

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

With use of a higher-level controller, the corresponding configuration software from the manufacturer of the higher-level controller is also required, e.g. Step 7 from Siemens.

### Device types

The following device types are used with KR C4 PROFIBUS:

- Controller: A controller that controls all the components of a system. A controller will also be referred to as the master in this document.
- Device: A field device subordinated to a controller. A device consists of a number of modules and submodules. A device will also be referred to as a slave in this document.
- Supervisor: Can be a programming device or industrial PC. Parallel to the controller, this has access to all process and parameter files.

The 3 device types have relationships for transferring configuration data and process data.

A physical device, e.g. the robot controller, can be a controller and/or a device. The configuration of communication relationships is carried out solely in the controller.

### Connection panel

Depending on the variant, either the connection X11 or X55 is provided. X11 or X55 is the connection for the power supply.

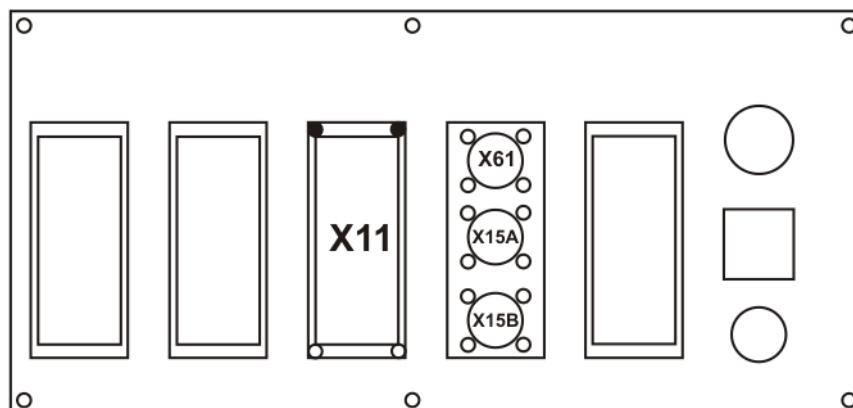


Fig. 2-1: Connection panel with interface X11

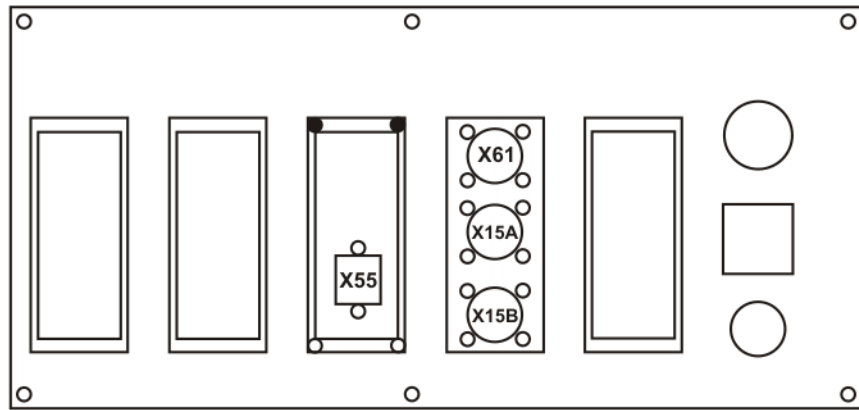


Fig. 2-2: Connection panel with interface X55

**Connector pin allocation**

Depending on the variant, different interfaces are provided:

- PROFIBUS Controller: Interface X61
- PROFIBUS Device: Interface X15A/X15B
- PROFIBUS Controller/Device: Interface X61 and X15A/X15B

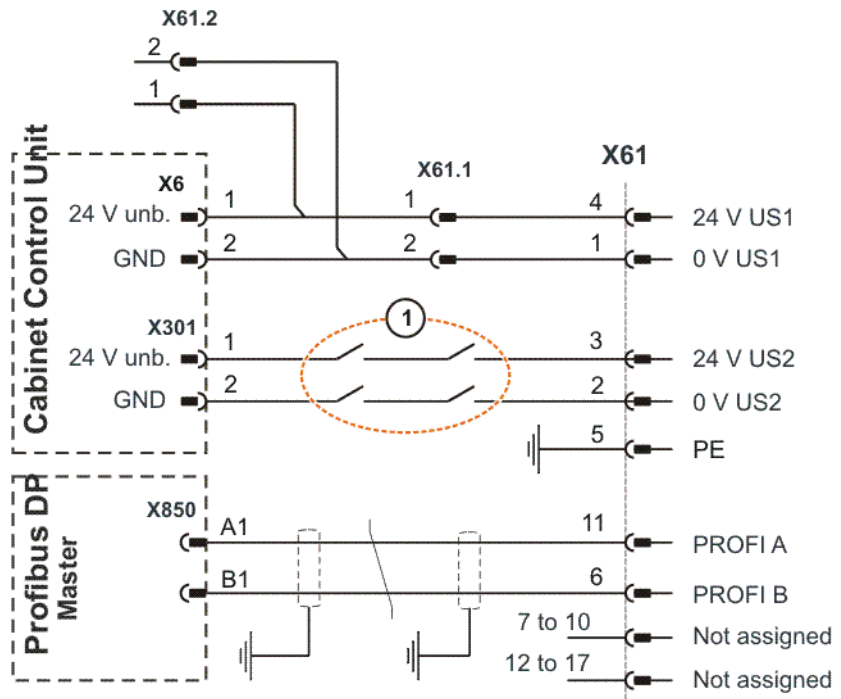


Fig. 2-3: Interface X61

- 1 “Activate drives” contacts (optional)



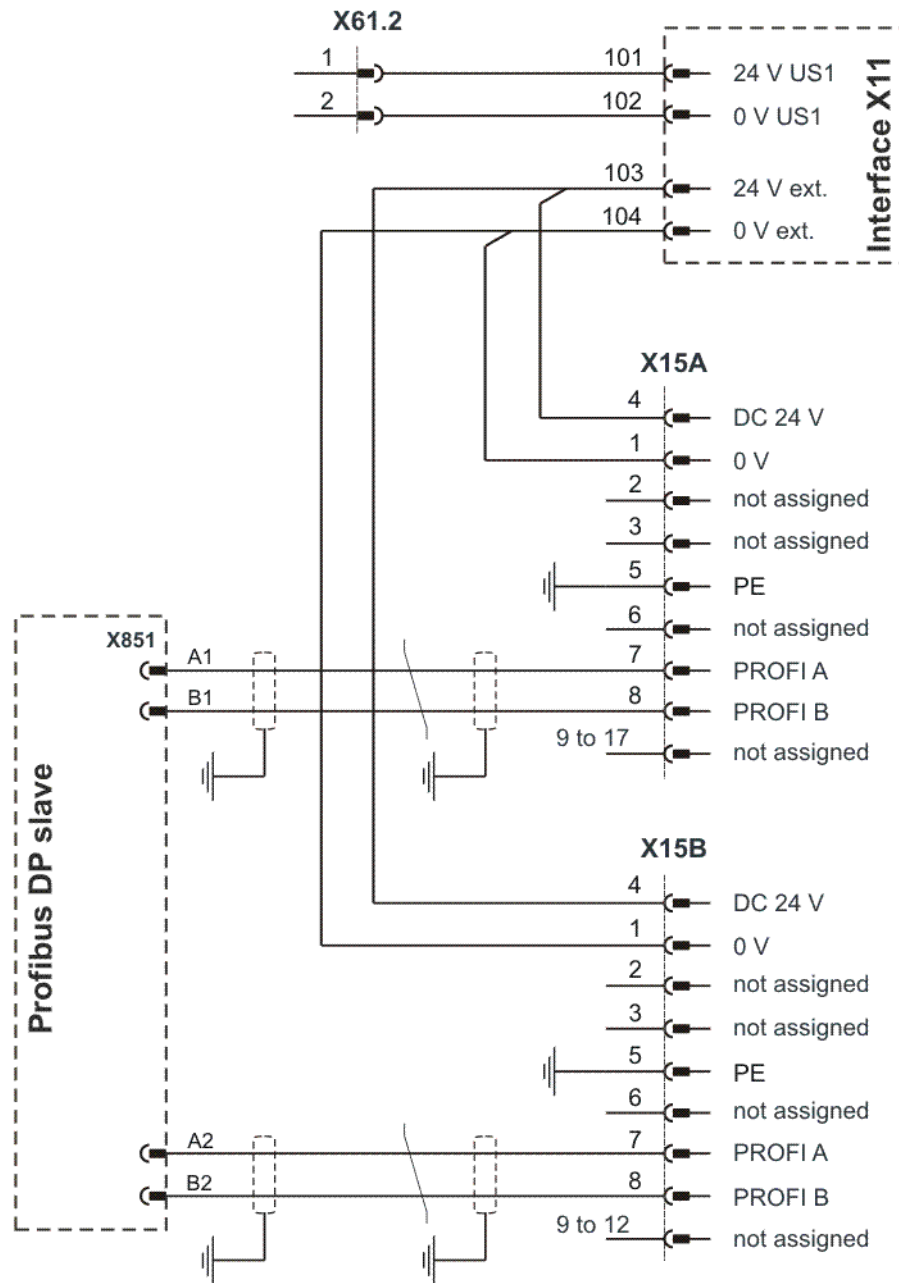


Fig. 2-4: Interface X15A / X15B with X11

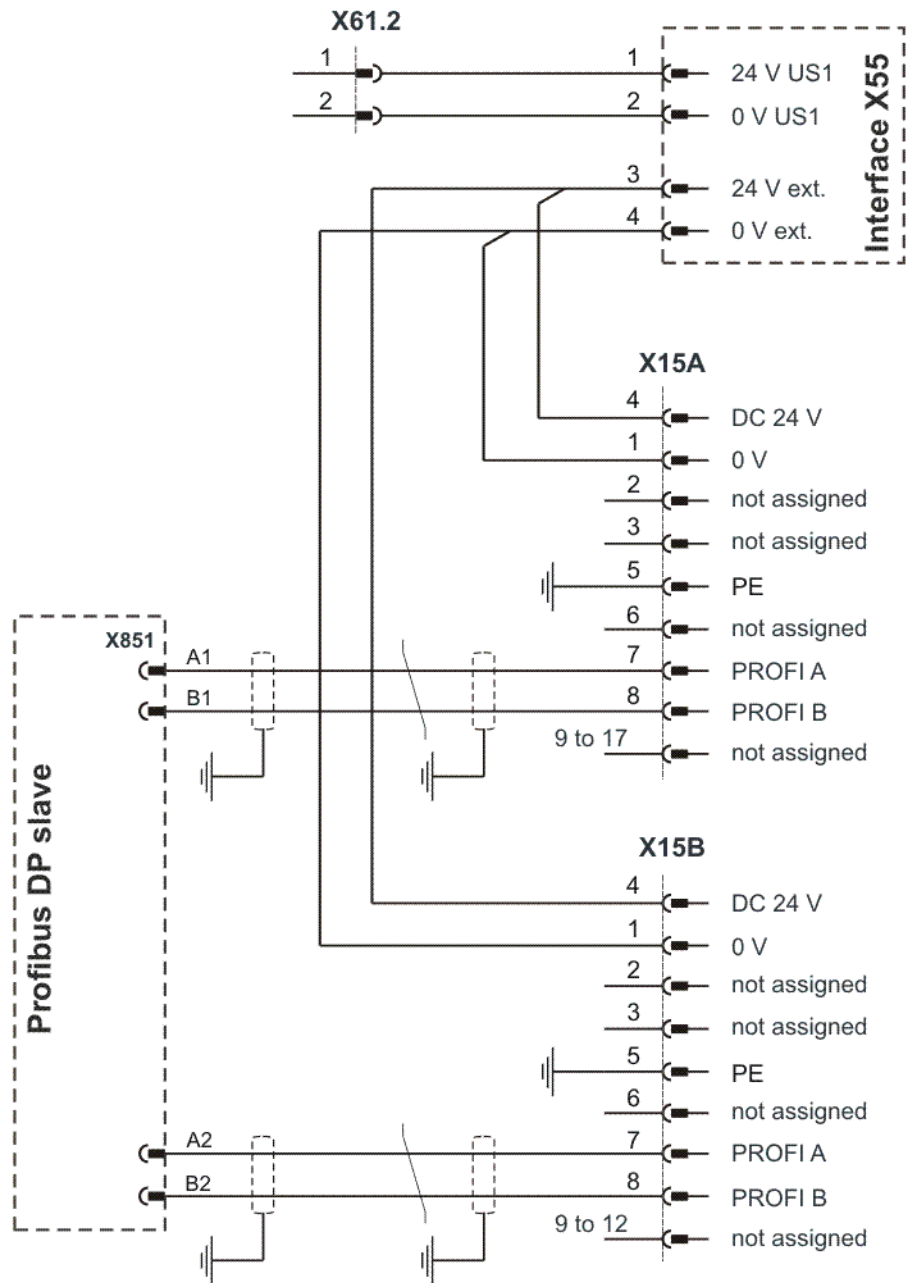



Fig. 2-5: Interface X15A / X15B with X55

### 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 or assembly instructions must be observed. Death to persons, severe physical injuries or considerable damage to property may otherwise result.



## **4 Start-up and recommissioning**

### **4.1 Routing the data cables**


- The PROFIBUS cables are routed to the devices from the controller or from the switch using a star or ring topology.



## 5 Configuration

### 5.1 Overview

Step	Description
1	Configure the higher-level controller with the manufacturer's configuration software.  <b>Note:</b> This step only needs to be carried out if a higher-level controller is being used. The required device description file can be found on the WorkVisual CD-ROM, in the following directory: DeviceDescriptions\GSD.
2	Make GSD files available.  (>>> 5.2 "Making GSD files available" Page 15)
3	Configure the PROFIBUS.  (>>> 5.3 "Configuring the bus with WorkVisual" Page 15)
4	Set the device address in WorkVisual.  (>>> 5.4 "Setting the device address in WorkVisual" Page 18)
5	Map the inputs and outputs in WorkVisual.  (>>> 5.5 "Mapping inputs/outputs in WorkVisual" Page 19)
6	Transfer the bus configuration from WorkVisual to the robot controller.

 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.

### 5.2 Making GSD files available


For the configuration of a device, WorkVisual requires the GSD file for this device. The GSD file must be obtained from the manufacturer of the device.

**Precondition**      ■ There is no project open.

**Procedure**

1. Select the menu sequence **File > Import / Export**.  
The **Import/Export Wizard** window is opened.
2. Select **Import device description file** and click on **Next >**.
3. Click on **Browse...** and specify a directory.
4. Confirm with **Next >**.  
A list is displayed of the devices that are to be imported.
5. Click on **Finish**.  
The devices are imported.
6. Close the **Import/Export Wizard** window.

### 5.3 Configuring the bus with WorkVisual

 With the variant PROFIBUS Controller/Device, the PROFIBUS master must be configured first, followed by the PROFIBUS slave.

### 5.3.1 Configuring the PROFIBUS master

**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. Open the tree structure as far as possible. Right-click on **EtherCAT** and select **Add...** from the context menu.
  5. A window opens. Select the bus coupler **EK1100 EtherCAT-Koppler (2A E-Bus)** and confirm with **OK**. The bus coupler is inserted in the tree structure.
  6. Open the tree structure as far as possible. Right-click on **EBus** and select **Add...** from the context menu.
  7. A window opens. Select the PROFIBUS Master Gateway **EL6731 PROFIBUS DP Master** and confirm with **OK**. The gateway is inserted in the tree structure.
  8. Open the tree structure as far as possible. Right-click on **Profibus IO** and select **Add...** from the context menu.
  9. A window opens with a list of devices. Select the PROFIBUS device used and confirm with **OK**. The device is inserted in the tree structure.

#### NOTICE

The inserted device must correspond to the actual device used in reality. Substantial damage to property may otherwise result.

10. Right-click on the device in the tree structure and select **Settings...** from the context menu. A window opens with device settings.  
The **Module Configuration 2** tab displays the slots on the device. Assign the slots to the modules used.  
(>>> 5.3.3 "Device settings" Page 17)
11. If necessary, repeat steps 9 to 11 for further devices.
12. Save the device settings by selecting **OK**.

### 5.3.2 Configuring a PROFIBUS slave

**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.
    - If no PROFIBUS master has been configured: Continue with step 2.
    - If a PROFIBUS master has been configured: Continue with step 6.
  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. Open the tree structure as far as possible. Right-click on **EtherCAT** and select **Add...** from the context menu.
  5. A window opens. Select the bus coupler **EK1100 EtherCAT-Koppler (2A E-Bus)** and confirm with **OK**. The bus coupler is inserted in the tree structure.
  6. Right-click on **EBus** and select **Add...** from the context menu.
  7. A window opens. Select the PROFIBUS Slave Gateway **EL6731-0010 PROFIBUS DP Slave** and confirm with **OK**. The gateway is inserted in the tree structure.



8. Open the tree structure as far as possible. Right-click on **Profibus IO** and select **Add...** from the context menu.
9. A window opens. Select the PROFIBUS slave **EL6731-0010** and confirm with **OK**. The PROFIBUS slave is inserted in the tree structure.
10. Right-click on the PROFIBUS slave in the tree structure and select **Settings...** from the context menu. A window opens with device settings.  
The **Module Configuration 2** tab displays the slots on the PROFIBUS slave. Assign the slots to the modules used.  
(>>> 5.3.3 "Device settings" Page 17)
11. Save the device settings by selecting **OK**.

### 5.3.3 Device settings

#### Slot configuration

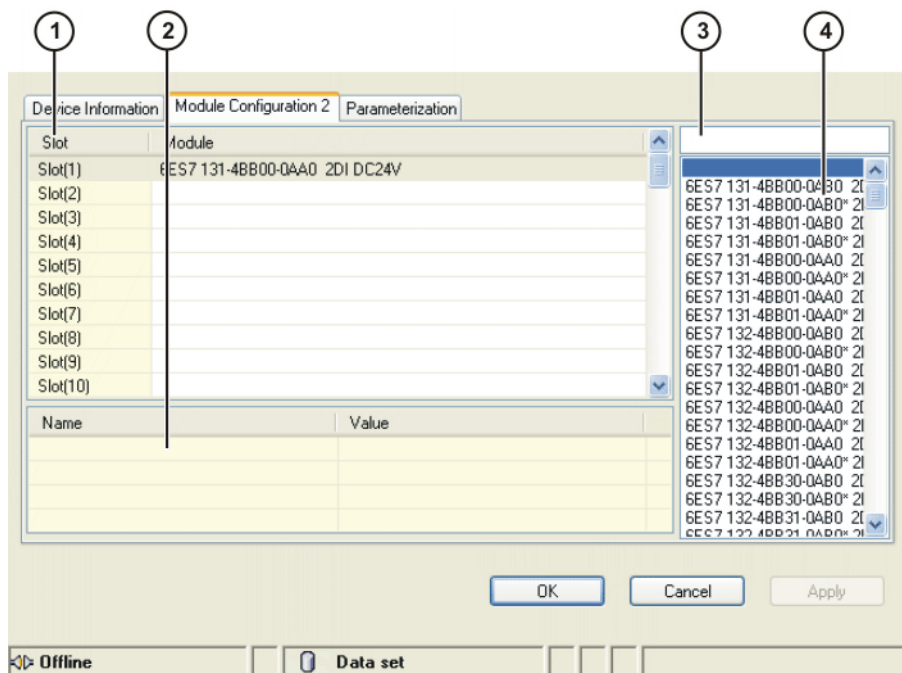


Fig. 5-1: Module Configuration 2 tab

- |                    |                 |
|--------------------|-----------------|
| 1 Slot             | 3 Search box    |
| 2 Parameter window | 4 Module window |

All the windows can be resized as desired.

Element	Description
Slot	<p>Number of slots on the device</p> <p>The number of slots displayed depends on the device selected. The number of slots displayed is always the maximum number possible for the device.</p> <p>To add a module to a slot, click on the slot and double-click on the desired module. To remove the module, click on the slot and double-click on the empty space above the first module.</p>
Parameter window	<p>The parameter window displays module-specific parameters, which can be set via a selection menu.</p>

Element	Description
Search box	The search box can be used to search for modules. The search is a full-text search. The search result is cleared when another slot is selected.
Module window	The available modules are displayed in the module window.

## 5.4 Setting the device address in WorkVisual

### Precondition

- A robot controller has been added and set as active.
- PROFIBUS master: One or more PROFIBUS devices have been added to the bus.
- PROFIBUS slave: The PROFIBUS slave has been added to the bus.

### Procedure for PROFIBUS master

1. Open the tree structure as far as possible. Right-click on **EL6731 PROFIBUS DP Master** and select **Settings...** from the context menu. A window opens.
2. On the **Profibus settings** tab, enter the device address of the PROFIBUS devices in the **Device Id** column (address range: 2...127) and confirm with **OK**.  
(>>> 5.4.1 "Settings for PROFIBUS master" Page 18)



The device addresses must also be set on the PROFIBUS devices themselves using the DIP switches.

### Procedure for PROFIBUS slave

1. Open the tree structure as far as possible. Right-click on **EL6731-0010 PROFIBUS DP Slave** and select **Settings...** from the context menu. A window opens.
2. On the **Profibus settings** tab, enter the device address of the PROFIBUS slave in the **Device Id** box (address range: 2...127) and confirm with **OK**.  
(>>> 5.4.2 "Settings for PROFIBUS slave" Page 19)

### 5.4.1 Settings for PROFIBUS master

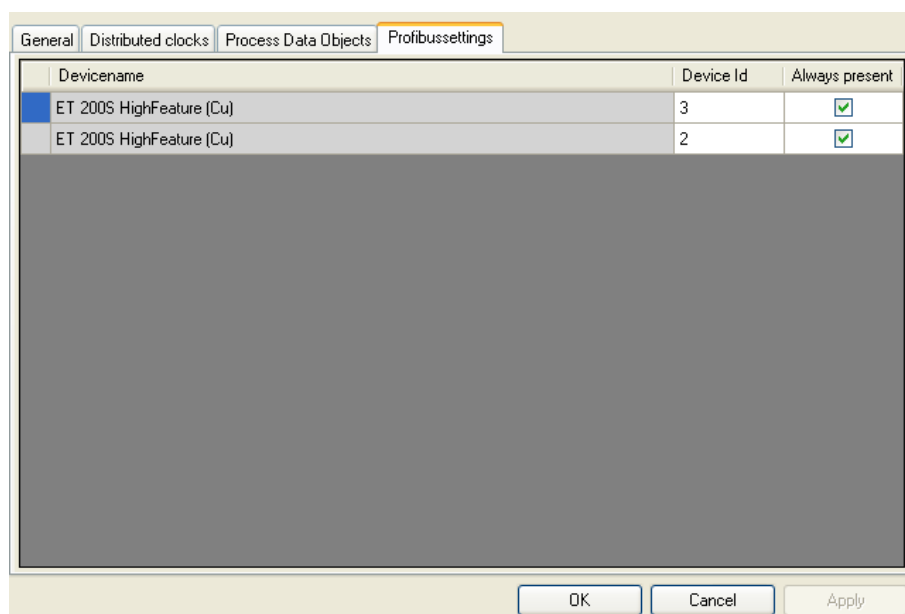


Fig. 5-2: "Profibus settings" tab (PROFIBUS master)

Column	Description
Device ID	Device address
Always connected	<ul style="list-style-type: none"> <li>■ <b>Activated:</b> The robot controller expects the device to be connected when the controller boots up. If the device is not connected, the robot controller issues an error message.</li> <li>■ <b>Deactivated:</b> The robot controller does not check whether the device is connected when the controller boots up.</li> </ul>

## 5.4.2 Settings for PROFIBUS slave

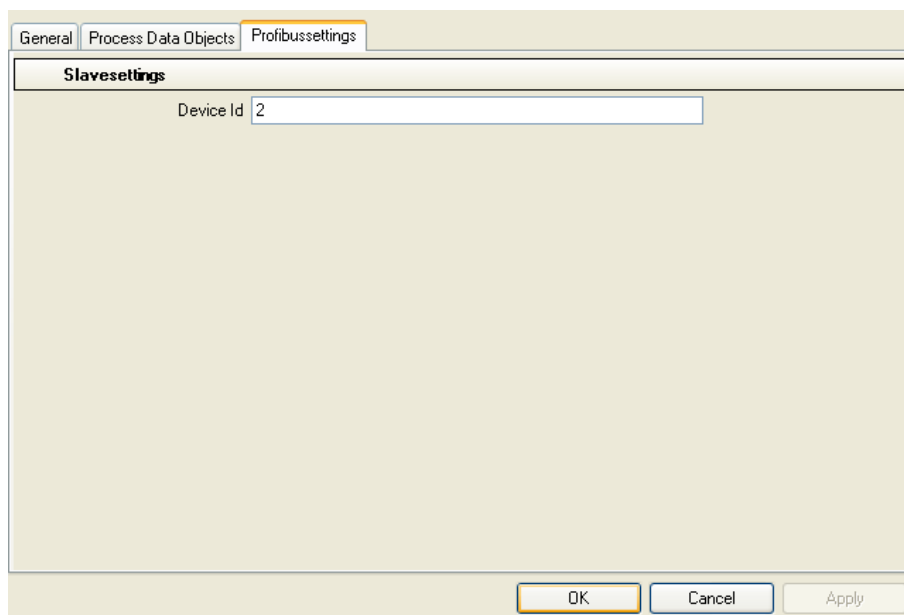


Fig. 5-3: “Profibus settings” tab (PROFIBUS slave)

Box	Description
Device ID	Device address

## 5.5 Mapping inputs/outputs in WorkVisual

**Procedure**      ■ Map the inputs/outputs in WorkVisual.

**Signal names**      PROFIBUS signal names have the following structure in WorkVisual:

Example **03:0001 Input**

I/O	Name	Type	Swap	Address
◀	01:0001 Input	BYTE		0.0
▶	02:0001 Output	BYTE		0.0
◀	03:0001 Input	BYTE		1.0
◀	03:0002 Input	BYTE		2.0

Fig. 5-4: PROFIBUS signal names in WorkVisual

Name	Meaning	In the example
1st value from left	Slot number <b>Note:</b> Modules without inputs/ outputs, e.g. power supply modules, have a number but are not displayed in the list.	03
2nd value from left	Index number (consecutive ascending numbering of the individual inputs/outputs)	0001
Input/Output	Direction of processing	Input

## 6 Operation

### 6.1 Coupling/decoupling devices

For certain applications, e.g. tool change, it is necessary to couple and decouple devices. Coupling and decoupling can only be carried out via KRL.

#### Decoupling

Properties of decoupled devices:

- If decoupled devices are disconnected from PROFIBUS or the power supply, no error is triggered.
- All I/O operations on decoupled devices remain without effect.
- Decoupled devices cannot carry out error treatment in the case of read/write errors.

#### Coupling

The IOCTL function is executed synchronously. It only returns when the device is functional and can be written to once again.

If a coupled device is not functional, e.g. because it is disconnected from the bus or supply voltage, a message is displayed after a timeout of approx. 2 seconds.

#### Always connected

The option **Always connected** affects the way the robot controller reacts to a decoupled device in the event of a cold start or I/O reconfiguration. **Always connected** can be set in WorkVisual in the settings of the PROFIBUS master.

(>>> 5.4.1 "Settings for PROFIBUS master" Page 18)

	<b>Always connected: Yes</b>	<b>Always connected: No</b>
<b>Device coupled</b>	No error message	No error message
<b>Device decoupled</b>	Error message	No error message

#### Syntax

```
ret = ioCtl("[bus instance name]", [command], [device address])
```

#### Description

[device address]: The ID of a device is displayed in WorkVisual in the **Device ID** box in the Profibus settings.

(>>> 5.4.1 "Settings for PROFIBUS master" Page 18)

Return values for RET:

<b>Value</b>	<b>Meaning</b>
-3	Timeout - device not reacting
-2	Device address not found
-1	General fault
0	Device successfully coupled/decoupled

#### Examples

Here, device 6 is decoupled.

```
...
RET = IOCTL("SYS-X44_PB-Master1", 'H003C', 6)
...
```

Here, device 6 is coupled.

```
...
RET = IOCTL("SYS-X44_PB-Master1", 'H0032', 6)
...
```

The timeout for coupling/decoupling is set by default to 2 s. This default value can be changed. Here the value is set to 5000 ms:

```
RET = IOCTL("SYS-X44_PB-Master1",8008,5000)
```

## 6.2 Executing queries / changes

### Description

A command can be used to execute a query or a change. Parameters are required for some queries and changes. If no parameter is required, "0" is entered as the parameter in the syntax.

### Syntax

```
ret = ioCtl("[bus instance name]", [command], [parameter])
```

### Overview

Query	Command	Parameter
I/O status of gateway module	&H8001	-
I/O status of gateway module and status of SYS-X44	&H8002	-
Device is optionally present on system start	&H8003	Device address
Device activated / deactivated	&H8004	Device address
Device has error status	&H8005	Device address
Number of devices with error	&H8006	-
Number of configured devices	&H8007	-
Timeout time for device activation	&H8009	-

Change	Command	Parameter
Timeout time for device activation	&H8008	Timeout time



Commands &H8003 to &H8009 are only available for the PROFIBUS Master Gateway.



The description of the PROFIBUS error codes can be found in the manufacturer's documentation.

### Command &H8001

#### Syntax

PROFIBUS Master Gateway:

```
ret = ioCtl("SYS-X44_PB-Master1", &H8001, 0)
```

PROFIBUS Slave Gateway:

```
ret = ioCtl("SYS-X44_PB-Slave1", &H8001, 0)
```

Return values for RET:

Value	Meaning
-1	General error during ioCtl
0	PROFIBUS OK
> 0	PROFIBUS error code

### Command &H8002

#### Syntax

PROFIBUS Master Gateway:

```
ret = ioCtl("SYS-X44_PB-Master1", &H8002, 0)
```

PROFIBUS Slave Gateway:

```
ret = ioCtl("SYS-X44_PB-Slave1", &H8002, 0)
```

Return values for RET:

Value	Meaning
-1	General error during ioCtl
0	SYS-X44 and PROFIBUS Gateway OK
> 0	Bus error code

Bus error codes:

Value	Meaning
Bit 0	SYS-X44 does not have the status OPERATIONAL
Bit 1	At least one device in the SYS-X44 has an error
Bit 2	Error during configuration / initialization on system start
Bit 3	Error present on gateway bus
Bit 4	Error during initialization / configuration in gateway module on system start

#### Command &H8003

#### Syntax

```
ret = ioCtl("SYS-X44_PB-Master1", &H8003, device address)
```

Return values for RET:

Value	Meaning
-1	Device address not found / general error
0	Device is not optionally present on system start
1	Device is optionally present on system start

#### Command &H8004

#### Syntax

```
ret = ioCtl("SYS-X44_PB-Master1", &H8004, device address)
```

Return values for RET:

Value	Meaning
-1	Device address not found / general error
0	Device is deactivated
1	Device is activated

#### Command &H8005

#### Syntax

```
ret = ioCtl("SYS-X44_PB-Master1", &H8005, device address)
```

Return values for RET:

Value	Meaning
-1	Device address not found / general error
0	Device has no error
> 0	PROFIBUS error code

#### Command &H8006

#### Syntax

```
ret = ioCtl("SYS-X44_PB-Master1", &H8006, 0)
```

Return values for RET:

Value	Meaning
-1	General error during ioCtl
0	All configured devices OK
> 0	Number of faulty devices



Deactivated devices which are not physically connected to the PROFIBUS line are also considered faulty and included in this return value.

### Command &H8007

#### Syntax

```
ret = ioctl("SYS-X44_PB-Master1", &H8007, 0)
```

Return values for RET:

Value	Meaning
-1	General error during ioctl
> 0	Number of configured devices

### Command &H8008

#### Syntax

```
ret = ioctl("SYS-X44_PB-Master1", &H8008, timeout time)
```



The timeout time must be specified in ms.

Return values for RET:

Value	Meaning
-1	General error during ioctl
0	Value in ms was set

### Command &H8009

#### Syntax

```
ret = ioctl("SYS-X44_PB-Master1", &H8009, 0)
```

Return values for RET:

Value	Meaning
-1	General error during ioctl
> 0	Timeout value in ms



## 7 Diagnosis

### 7.1 Displaying diagnostic data



The diagnostic data can also be displayed in WorkVisual. Information about procedures in WorkVisual is contained in the WorkVisual documentation.

#### Procedure

1. Select **Diagnosis > Diagnostic monitor** in the main menu.
2. Select the desired module in the **Module** box.  
Diagnostic data are displayed for the selected module.

#### Description

Diagnostic data can be displayed for the following modules:

- ECatIODriver
- SYS-X44\_PB-Master1
- SYS-X44\_PB-Slave1

#### ECatIODriver

"Name" column	Description
<b>Driver version</b>	Name of the driver
<b>Bus instance</b>	Name and state of the bus instance

#### SYS-X44\_PB-Master1

"Name" column	Description
<b>Device name</b>	Name of the controller
<b>Device version</b>	Controller version
<b>Number of slaves</b>	Number of devices
<b>Number of slaves with error</b>	Number of devices where an error has occurred.
<b>Cycle-Fail-Counter</b>	Counter for bus cycle errors
<b>Cycle time</b>	Time (in $\mu\text{s}$ ) required by the controller for an update
<b>Min. cycle time</b>	Minimum time (in $\mu\text{s}$ ) required by the controller for an update
<b>Max. cycle time</b>	Maximum time (in $\mu\text{s}$ ) required by the controller for an update
<b>Station address</b>	Address of the controller
<b>Baud rate</b>	Baud rate of the controller
<b>Slave info(0)</b>	Name and device address of the first device
<b>Slave state(0)</b>	Status of the first device
<b>Slave info(1)</b>	Name and device address of the second device
<b>Slave state(1)</b>	Status of the second device
<b>Slave info(2)</b>	Name and device address of the third device
<b>Slave state(2)</b>	Status of the third device

#### SYS-X44\_PB-Slave1

"Name" column	Description
<b>Device name</b>	Name of the device
<b>Device version</b>	Version of the device
<b>Station address</b>	Device address
<b>Slave status</b>	Status of the device
<b>Baud rate</b>	Baud rate of the device



## 8 Messages

No. / type	Message text
2858 Stop message	Ackn. Stop due to field bus error
1034 Status message	Error on writing, driver: <i>driver name</i>
10039 Status message	<i>bus name</i> : Profibus master error in module [ <i>module name</i> ]( <i>error code</i> ) <b>Note:</b> The description of the error codes can be found in the manufacturer's documentation for the PROFIBUS master.
4429 Status message	<i>bus instance name</i> : Profibus master configuration error ( <i>cause of error</i> ) <b>Note:</b> The possible causes of errors are given in the following table.

### Error causes

Cause of error	Description	Remedy
Invalid ECatWrapper interface	System error	<ol style="list-style-type: none"> <li>1. Reboot the system with a cold start.</li> <li>2. If the error is still displayed, inform KUKA Service.</li> </ol>
IODataCreate() Error	System error	<ol style="list-style-type: none"> <li>1. Reboot the system with a cold start.</li> <li>2. If the error is still displayed, inform KUKA Service.</li> </ol>
System Manager interface invalid	System error	<ol style="list-style-type: none"> <li>1. Reboot the system with a cold start.</li> <li>2. If the error is still displayed, inform KUKA Service.</li> </ol>
Error opening 'ecatms_sys_X44_swap.xml' File	The file ecatms_sys_X44_swap.xml contains syntax errors.	<ol style="list-style-type: none"> <li>1. Correct the file.</li> <li>2. Reconfigure the bus.</li> </ol>
found Gateway multiple	There is more than one identical gateway.	<ol style="list-style-type: none"> <li>1. Remove the superfluous gateway module from the bus.</li> <li>2. Reconfigure the bus.</li> </ol>
unable to create Gateway-SEM	System error	<ol style="list-style-type: none"> <li>1. Reboot the system with a cold start.</li> <li>2. If the error is still displayed, inform KUKA Service.</li> </ol>
unable to spawn Gateway-Task	System error	<ol style="list-style-type: none"> <li>1. Reboot the system with a cold start.</li> <li>2. If the error is still displayed, inform KUKA Service.</li> </ol>
invalid Gateway PDO-Config	No valid process data configuration is available for the gateway module.	<ol style="list-style-type: none"> <li>1. Check the bus configuration and correct if necessary.</li> <li>2. Reconfigure the bus.</li> </ol>

Cause of error	Description	Remedy
unable to allocate Gateway-Memory	System error	<ol style="list-style-type: none"><li>1. Reboot the system with a cold start.</li><li>2. If the error is still displayed, inform KUKA Service.</li></ol>
invalid Gateway-ID	The gateway module is unknown.	<ol style="list-style-type: none"><li>1. Use a different gateway module.</li><li>2. Reconfigure the bus.</li></ol>
invalid Gateway Error-Byte Config	The error status bytes of the devices do not match the bus configuration.	<ol style="list-style-type: none"><li>1. Check the bus configuration and correct if necessary.</li><li>2. Reconfigure the bus.</li></ol>
invalid optional Slave Configuration	The file ecat_PBM_Gateway.xml is faulty.	<ol style="list-style-type: none"><li>1. Correct the file.</li><li>2. Reconfigure the bus.</li></ol>

## 9 KUKA Service

### 9.1 Requesting support

**Introduction** The KUKA Roboter GmbH documentation offers information on operation and provides assistance with troubleshooting. For further assistance, please contact your local KUKA subsidiary.

**Information** The following information is required for processing a support request:

- Model and serial number of the robot
- Model and serial number of the controller
- Model and serial number of the linear unit (if applicable)
- Version of the KUKA System Software
- Optional software or modifications
- Archive of the software
- Application used
- Any external axes used
- Description of the problem, duration and frequency of the fault

### 9.2 KUKA Customer Support

**Availability** KUKA Customer Support is available in many countries. Please do not hesitate to contact us if you have any questions.

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## Index

### C

Configuration 15  
Coupling, device 21

### D

Decoupling, device 21  
Diagnosis 25  
Diagnostic monitor (menu item) 25  
Documentation, industrial robot 5

### G

GSD 6  
GSD files, making available 15

### I

Introduction 5

### K

KUKA Customer Support 29

### M

Mapping, inputs/outputs 19  
Messages 27

### O

Operation 21

### P

PLC 6  
Product description 7

### R

Recommissioning 13

### S

Safety 11  
Safety instructions 5  
Service, KUKA Roboter 29  
Start-up 13  
Step 7 6  
Support request 29

### T

Target group 5  
Timeout, coupling 22  
Timeout, decoupling 22  
Trade mark 5

### W

Warnings 5



