

# mxAutomation library for KUKA



Programming of KUKA robots, PLCopen certified.

The available function block library enable the programming, diagnosis or manual movements of KUKA robots via FB blocks of the PLC.

The product - including runtime on the robot controller - can be ordered from KUKA robotics under "KUKA.PLC mxAutomation 3.3" order number: 00-397-175.

➔ This version is suitable for the KUKA System Software V8.6 (KR C4) and V8.7 (KR C5).

## Product Description

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The library brings nearly all programming commands of the KUKA language into the PLC. Existing option packages, e.g. KUKA.ConveyorTech or KUKA.VectorMove, can be addressed via the FBs of mxAutomation. PLCopen compliant FBs allow easy application.

The download includes an example project with the option of different fieldbus connections to the robot. (EtherCAT and UDP).

Ethernet IP and Profinet are available on request.

## Range of Functions

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### Possibilities of the library:

- Control up to five robots simultaneously
- Jogging and TouchUp
- Linear movements (LIN)
- Point to point movements (PTP)
- Circular movements (CIRC)
- Approximate positioning
- Path-related switching actions
- Functions for interrupt programming
- Configuration, diagnosis and use of the workspaces
- Write and read bases, tools and the actual position
- Change and monitor Cartesian workspaces
- Start brake and mastering test
- Use of existing KRL programs using additional system variables
- Conveyor tracking – KUKA.ConveyorTech  
Synchronize robot movements with linear or circular movements of a conveyor
- Soft switching of the kinematics – KUKA.Vectormove  
Robots are moved along a defined vector in Cartesian space by an external force.
- Load data determination – KUKA.LoadDataDetermination **NEW from mxA V3.3**  
Option package for determining the mass, center of gravity and moments of inertia of loads attached to the robot flange.

### Commissioning and maintenance

- Manual operation with KUKA-SmartPAD as well as with our jog function block possible
- Read all error messages from the robot in plain text (Message handler KRmsgNET)
- Automatic language switching for error messages is possible

**Safety functions:**

- Profisafe or CIPSafety or FsoE or parallel wired
- Full compatibility with KUKA.SafeOperation and all other KUKA safety features.

HMI - Simple application to understand the basic functionalities

**Start the mxA-communication  
Reset Errors**

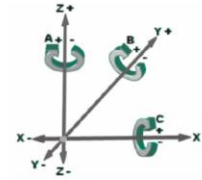
**Jog the Robot**

**Configure the Tool/Base  
Set the IP-Address**

The screenshot displays the KUKA HMI interface with several key components:

- Project Tree (Left):** Lists various modules such as EtherCAT, UDP, mxA\_Jog, and HMI\_Jog.
- State of the Robot:** Shows 'Start mxAutomation' and 'Error ID 0'.
- Control Panel (Top Right):** Includes 'Override: 1%', 'buffer' indicators, and a 'KUKA' logo.
- Jog the robot:** Features buttons for 'Read / write data', 'Run a sequence', 'Teach and play', and 'KRC messages'.
- Jog Advanced:** Contains 'Activate JogAdvanced', 'JogAdv. MoveType: 1', and 'Settings for jog command'.
- move absolute Axis:** A grid of buttons for axes A1 through A6.
- move absolute Cart:** A grid of buttons for Cartesian coordinates X, Y, Z, A, B, C.
- Live position:** Displays coordinates (X: 1717.33, Y: -40.30, Z: 2177.73) and tool/base data.
- configuration:** Shows IP address (10.49.116.13) and checkboxes for 'Enable T1', 'Enable T2', and 'Enable AutoExit'.

Red lines connect the text labels on the left to their corresponding elements in the HMI interface.



Program - Simple application to understand the basic functionalities

UDP-communication

Quit errors

Start the communication

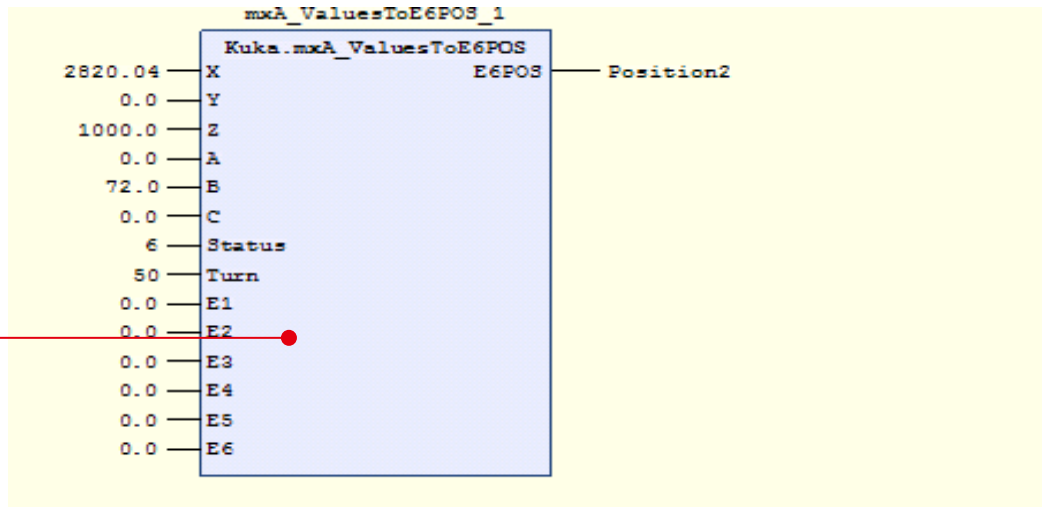
The screenshot shows the SIMATIC Manager software interface. On the left, a project tree displays a PLC application named 'mx4.3.2\_example\_website\_V35'. Within this application, the 'SPS-Logik' folder contains several programs, including 'mxA\_01\_Start (PRG)', 'mxA\_02\_MotionControl (PRG)', 'mxA\_03\_Conversion (PRG)', 'mxA\_04\_JogFast (PRG)', 'mxA\_05\_Read\_Write\_Data (PRG)', 'mxA\_06\_Motion (PRG)', and 'mxA\_07\_teach\_and\_play (PRG)'. Red circles and lines mark these programs in the tree, corresponding to the text labels 'UDP-communication', 'Quit errors', and 'Start the communication'.

The main window displays the ladder logic for the program 'KRC\_AutoStart\_0'. It consists of several network diagrams:

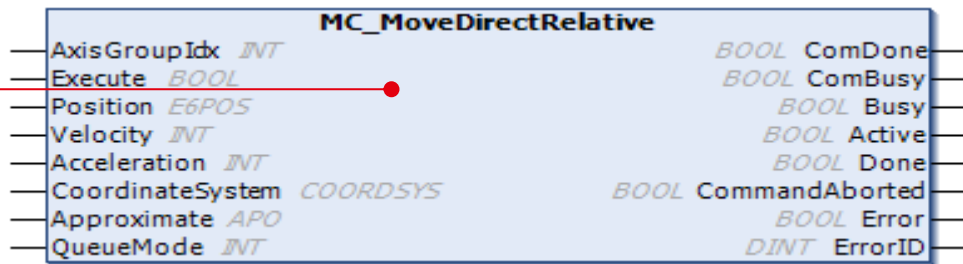
- Network 1: KRC\_Initialize\_0** - Shows initialization of KRC parameters like KRC\_Serial, KRC\_Minor, KRC\_Revision, PLC\_Minor, and PLC\_Revision.
- Network 2: KRC\_Error\_0** - Shows error handling logic, including KRC\_Message and KRC\_MessageReset.
- Network 3: KRC\_AutoStartExternal\_0** - Shows a complex set of status checks for various KRC components like KRC\_Ready, KRC\_Stop, KRC\_Standstill, and KRC\_Stopped.
- Network 4: KRC\_AutoStart\_0** - Shows the final auto-start logic, including KRC\_AutoStart and KRC\_AutoStart\_Ext.

At the bottom, a monitoring list 'Überwachungsliste 1' is visible.

Simple structure  
of coordinates



Move command  
Open-PLC



## General information



<b>Supplier</b>	KUKA Detuschland GmbH Zugspitzstraße 140, 86165 Augsburg
<b>Support</b>	E-Mail: <a href="mailto:CustomerService@kuka.com">CustomerService@kuka.com</a> KUKA 24/7 technische Hotline: +49 821 797 -1926
<b>Product</b>	KUKA.PLC mx-Automation 3.3
<b>Order No.</b>	00-279-817
<b>Sales</b>	<a href="https://www.kuka.com">https://www.kuka.com</a>
<b>Content of download</b>	<ul style="list-style-type: none"><li>▪ mxAutomation 3.0.2 Library für CoDeSys</li><li>▪ Sample project for communication via EtherCAT</li><li>▪ Sample project for communication via Profinet</li><li>▪ Sample project for communication via UDP</li></ul>

## System requirements and restrictions

<b>Programming system</b>	CODESYS Development System V3.5.18.20
<b>Runtime system</b>	CODESYS Control V3.5.18.20
<b>Supported platforms / devices</b>	Robots Control type: KR C4 or KR C5 Simulation via "KR C4 OPS" or "KR C5 OPS" possible
<b>Additional requirements on the KUKA robot</b>	System software: from KSS 8.5.0 Software option: mxAutomation V3.3 PronConOS ltd (Comes with mxAutomation for free) Configuration software: WorkVisual V6 (free of charge)
<b>Restrictions</b>	These examples demonstrate just the basic structure of an mxAutomation PLC program. KUKA does assume no liability for using these examples on our real robot.
<b>Licensing</b>	It is not necessary to license the PLC Library
<b>Necessary accessories</b>	In order to be able to use the special functions via mxAutomation, the respective technology options must be installed on the KRC. <ul style="list-style-type: none"><li>▪ For PROFINet -&gt; KUKA.ProfiNet (additional software)</li><li>▪ For EtherNet/IP -&gt; EtherNet/IP (additional software)</li><li>▪ For EtherCAT -&gt; EtherCAT Bridge FSoE M/M (additional software)</li><li>▪ For UDP -&gt; noting</li></ul>

Please note: Not all CODESYS functions are available in all countries.  
For more information on these country-specific restrictions, please contact [support@codesys.com](mailto:support@codesys.com).