

KUKA youBot Safety



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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

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1 Introduction


1.1 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.

Hints

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

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

1.2 Terms used

Term	Description
User	The user of the youBot can be the management, employer or delegated person (e.g. system integrator) responsible for use of the youBot. Under certain circumstances, the user and the system integrator can be one and the same (legal or natural) person.
EC Machinery Directive	Machinery Directive 2006/42/EC
EMC	Electromagnetic compatibility, Directive 2004/108/EC
Device	See definition in EMC Directive 2004/108/EC.
ESHRs	Essential Health and Safety Requirements; Annex 1 to the Machinery Directive (Directive 2006/42/EC).
Manipulator	The robot arm and the associated electrical installations.

Term	Description
Machine	See definition in Machinery Directive 2006/42/EC.
EMERGENCY OFF	The EMERGENCY OFF shuts off the power to all motors of the youBot platform and/or youBot arm; the motors can move freely.
EMERGENCY STOP	The EMERGENCY STOP interrupts the EtherCAT communication. Each individual controller detects an interruption in the communication and attempts to stop the assigned motor by means of position control.
System integrator	<p>The task of the system integrator is to commission the youBot system safely.</p> <p>Under certain circumstances, the user and the system integrator can be one and the same (legal or natural) person.</p>
youBot arm	5-axis manipulator
youBot platform	Omnidirectionally movable transport system

2 Safety

2.1 General safety instructions

The general safety instructions apply to all youBot components and systems. Special safety instructions for the components youBot arm and youBot platform or the youBot system are specified separately in the documentation.

If a machine as defined by the EC Machinery Directive is developed on the basis of the modular youBot system, the corresponding standards and the essential health and safety requirements for the design and construction of machinery must be met.



The user/system integrator must perform a risk assessment in accordance with the EC Machinery Directive and implement the measures defined in the risk assessment.

- The youBot system and individual components must only be used in perfect technical condition.



CAUTION Risk of personal injury and damage to property: No modifications may be made to the mechanical, electrical and electronic systems by the user, system integrator or operator.

- The user/system integrator must observe the legal requirements of the EMC Directive for all components.



This is a Class A device. This device may cause radio interference in residential areas.

- No sharp, pointy or other hazardous objects may be mounted on the youBot components.
- In accordance with the applicable occupational health and safety regulations, the user/system integrator must ensure that the relevant safety measures (personal protective equipment, observation of the ESHRs and safety requirements) are taken in order to protect operators.
- The user/system integrator must also instruct the operator in accordance with all other risk assessments that have been made. An additional risk assessment for occupational health and safety must be carried out and implemented for start-up, maintenance and servicing personnel.
- The user/system integrator must ensure that all persons are outside the hazard area during operation of the youBot system or components thereof.



CAUTION Risk of collision! The individual youBot components and the youBot system have no collision protection. The user/system integrator must ensure that the axes of the youBot arm do not hit the mechanical end stops.



CAUTION Risk of collision! The drive axes of the individual youBot components and the youBot system have no mechanical brakes. Even in the event of an EMERGENCY STOP, the drive axes remain energized (under position control). Overloading of a drive (during an EMERGENCY STOP or during operation) can result in the drive being de-energized (PWM = 0) to prevent thermal destruction of the drive. The motions of the youBot arm in such a case cannot be predicted exactly.



⚠ CAUTION

Risk of personal injury and damage to property: When programming the software, the parameters of components (e.g. axis end stops, axis speeds) and workspaces must be observed.

⚠ CAUTION

Risk of personal injury and damage to property: Following modifications to the firmware parameters, the user/system integrator must carry out a function test, e.g. EMERGENCY STOP, max. speed, collision prevention with axis end stops, etc.

- EMERGENCY OFF design: User/system integrator must comply with the specifications of the EC Machinery Directive and international laws.
- The youBot system and the youBot components may only be operated in the specified ambient conditions, and not outdoors.
- youBot components must be de-energized before work is carried out on them. They are de-energized by disconnecting the youBot power supply unit and the youBot battery.
- Electrical and electronic components must not be touched.

2.1.1 Safety instructions, youBot arm

The following safety instructions apply to the youBot arm, irrespective of whether this is being operated as a stationary installation or on a youBot platform.

- The youBot arm must be fastened to a suitable surface so that the youBot arm cannot topple over or slide.
- The user/system integrator must specify the hazard area/workspace of the youBot arm and ensure that there are no persons and/or body parts in this area while the youBot arm is moving.
- The user/system integrator must inform the operator of the risk of injury from motion of the axes (e.g. risk of crushing); wear a hair net and closely fitting clothing.

NOTICE

During initialization, ensure that the axes are free to move in the initialization direction and are not blocked. Further information about the initialization direction is contained in the Trinamic operating and programming instructions ETHERCATTM MANUAL for axis controller TMCM-KR-1632/TMCM-1610-KR.

2.1.2 Safety instructions, KUKA youBot platform

The following safety instructions apply to the youBot platform, irrespective of whether the youBot platform is being operated separately or as a system (combination with youBot arm(s)):

- The user/system integrator must carry out a risk assessment for the selected velocity and load. The following must be taken into consideration for the load: transport safeguard with regard to changes of direction, acceleration and deceleration.
Hazardous loads and loads exceeding the maximum load are not permissible.
- Do not operate the youBot platform on sloping surfaces (loss of motion control). The youBot platform may only be operated on horizontal, dry and lint-free surfaces.
- Risk of the youBot platform falling if operated on a table or similar raised surface; install correspondingly fixed safeguards or barriers. Safeguards

and barriers must be at least the same height as the wheels of the youBot platform.

- The required degree of protection of the youBot platform is only achieved with the cover mounted.
- The user/system integrator must inform the operator of the risk of injury from rotation of the wheels (e.g. risk of cutting, risk of tangling of hair or clothing); wear a hair net, sturdy, closed footwear and closely fitting clothing.

2.1.3 Safety instructions, KUKA youBot system

The following safety instructions apply to the youBot system:

- Risk of the youBot system falling if operated on a table or raised surface; install correspondingly fixed safeguards or barriers. Safeguards and barriers must be at least the same height as the wheels of the youBot platform.



CAUTION Risk of personal injury and damage to property: If the youBot system is operated on a table or raised surface, the user/system integrator must install corresponding safety equipment.



CAUTION Risk of personal injury and damage to property: The maximum permissible payload of the youBot arm is only valid for motion of the arm alone, without additional movements of the youBot platform. The forces on a payload resulting from a combined motion of the youBot arm and the youBot platform must be taken into consideration. Set down objects on the support area and secure them before commencing motion or retract the youBot arm with the load held in the gripper.

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