Inxpect SRE - UR+ Safety Guide

Safety guide for Inxpect SRE integration

Revision	***Author***	***Date***	***Notes***
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v01		

1. Introduction

This document is not meant to replace any safety standard and cannot be considered as a comprehensive guide on how to guarantee the safety of robot applications.

The scope of this document is to guide the user or system integrator on how to properly evaluate the risks associated with the robot application, referencing the relevant document and procedure which must be followed in order to properly design the safety around such a robot application.

The Inxpect Safety Radar Equipment (SRE) can be a suitable solution for the risk reduction of some of the hazards related to a robot application. The integrator must perform a risk assessment in order to define the hazards and evaluate what are the relevant risks that can be reduced using the Inxpect SRE.

2. Inxpect SRE

2.1. Operating principles and instructions for use

Inxpect SRE is a radar based device, which is able to detect the presence of the operators inside dangerous areas by using a motion detection algorithm.

Inxpect SRE is a device which is capable of performing the following safety functions:

- access detection: the SRE is able to detect the access of a person in the defined detection zone
- restart prevention: the SRE can detect the presence of an operator in the defined detection zone by sensing up micro-movements

Inxpect SRE instruction manual carefully describes the range of applicability and the limitations of this safety device. It's very important to read and fulfill the requirements of the instruction manual in order to properly configure and install the Inxpect SRE. The instruction manual (200S System Instruction Manual) can be downloaded from the following link, after registration:

https://tools.inxpect.com

Additional documents that may help in the definition of the proper installation and configuration of the Inxpect SRE are available at the same link:

- 100S_200S TUTORIAL - Robotic cell configuration
- 100S_200S Cable specifications
- 100S_200S EPLAN parts

For the integration of the Inxpect SRE with UR robots, the following document provides an example and detailed guidelines:

- 100S_200S TUTORIAL - Universal Robot e-Series configuration

We recommend referring to the above document to understand how the interface between the Inxpect system and the UR robot can be handled.

2.2. Safety parameters and regulatory compliance

Inxpect SRE is a safety device operating under the Machinery Directive and meant to be used to reduce the risk associated with industrial machineries and processes.

Inxpect SRE safety performance parameters are available in section 8 of the Instruction Manual. The most relevant safety parameters are the following:

- SILcl 2 according to IEC/EN 62061

- SIL 2 according to IEC 61508
- PL d according to EN ISO 13849-1
- Performance Class D according to IEC TS 62998-1
- Type 3 ESPE according to IEC 61496-1

The system is assessed by third parties notified bodies for the following compliance:

- Machinery Directive (2006/42/EU)
- Radio Equipment Directive (2014/53/EU)
- RoHS III (2015/863)

The declaration of conformity, as well as product certificates can be found at the following link:

https://www.inxpect.com/downloads

3. Relevant standards for the risk assessment

The most important standard to be considered when designing a robot application is the ISO 10218-2. The current standard was released in 2011, and is now under revision. The new edition is expected to be published soon, and it's important to consider the new standard when it will be introduced.

ISO 10218-2 shall be used to identify the risks associated with the robot application, leveraging specifically Section 4 and Annex A. Section 4 references ISO 12100, which provides requirements and guidance in performing hazard identification and risk reduction, together with other relevant safety standards. Annex A starts from ISO 12100 and provides a list of significant hazards for robot and robot systems.

The requirements of safety related devices that are part of the robot control system shall be designed according to at least one of the following requirements:

- PLd with structure category 3 or fulfilling requirements of section 5.2.2
- SIL2 with HFT=1 and proof test interval no less than 20 years

Inxpect SRE fulfills the requirements of section 5.2.2, in particular the safety performance are:

- PLd, cat. 3 (ISO 13849-1)
- SIL2, HFT=0 (IEC 62061)
- PFHd < 2E-08 (see the manual for exact values)
- Type 3 ESPE, according to IEC/EN 61496-1

It is important to note that the ISO 10218-2 standard addresses all the possible risks associated with a robot application, while our sensor can be used to reduce some of those risks. For example our sensor is not suitable to reduce the noise hazards, while it is perfectly suitable for the reduction of some mechanical hazards (e.g. stopping the robot when a person is too close to it).

The document "100S_200S TUTORIAL - Robotic cell configuration" shows how the sensor can be used to implement a "perimeter safeguarding" (5.5.1 of ISO 10218-2) and for prevention of "unexpected start-up" (5.6.3.4 of ISO 10218-2). The performance of the Inxpect SRE is sufficient to address these safety functions (in most of the applications), but the number of safety functions for which the Inxpect SRE is suitable is larger. Once again, it's important that each hazard is evaluated and addressed so as to understand if the Inxpect SRE has all the adequate characteristics needed to correctly reduce the analyzed hazard.