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Dear Mr. Waldherr,

You ordered the calculations of your circuit diagram „Lasersicherheitsabschaltung SPIHSP11“ according to DIN EN ISO 13849-1:2008-12 at DEKRA EXAM GmbH.

The calculation was conducted based on the provided documents and using the tool SISTAMA of the “Institutes für Arbeitsschutz der deutschen gesetzlichen Unfallversicherung” and the Siemens standards SN29500-x. The results are illustrated below:

The circuit based on the provided circuit diagram itself is not able to execute any safety function. Therefore the correct integration of the SPIHSP11 with the necessary sensors, control unit SPISCU11 and either 2 actors “EATON – DILA-31(24VDC)” or 2 actors “SIEMENS 3RH2131-1BB40” needs to be done. By this successful integration, as well with the overall system, the complete safety function is realized. Neither sensors, nor actors are part of the delivery. Furthermore the safety characteristics of the sensors and the application specific switching cycles of the actors are unknown. As a result, we cannot calculate the performance level of the complete safety function.

In order to provide a basis for engineer’s calculation of a complete safety function including your circuit, we derived the following values from your circuit diagram according to DIN EN ISO 13849-1:2008-12:

- Category 3
- MTTFd [a] 100 years (high)
- DCavg [%] 90% (medium)
- CCF 65 points (fulfilled)

According to these values and by correct connected sensors, control unit, actors and power supply with adequate safety integrity and considering the requirements of DIN EN ISO 13849-

1:2008-12 it is possible to reach for the whole safety function by using the forcibly guided contacts of the actor including evaluation of their feedback the following performance level:

- Performance Level PL d
- Safety Integrity Level SIL 2 (according to DIN EN ISO 13849-1:2008-12 table 4)

In addition to the functional safety measures applied to the parts of the control system and allocated to the technical components, there are organizational and technical measures, which have to be taken to protect eyes and body regardless of the control system. Those are: Limit of the power of the laser to maximum 100W; Wearing protective glasses against laser beam reflections; Housing the laser in a closed and safe cabin, with protection doors and laser protective glass as well as safety related optical indication of laser power supply switch-off, whereupon the size of the cabin has to avoid that humans can be inside while protected doors are closed; Execution of periodical training and tests in order to guarantee the correct function of the procedures and equipment; …

Thank you for your order and we appreciate future cooperation.

Kind regards
DEKRA EXAM GmbH

Dipl.-Ing. BA Marc Kipping

B. Ing. Oussama Cherichi