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Technical Report

of the

Maintenance Safeguarding Safe Access System Key In Pocket

Applicant

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Testing Laboratory for Safety Components

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Modification History

Rev.	Status	Date	Author	Modification / Description
1.0	Active	2023-12-15	Dr. Julian Wolf	Initial version

Table 1: Modification history

List of Abbreviations

Abbreviation	Description
CAT	Category
FMEA	Failure Mode and Effects Analysis
FSM	Functional Safety Management
PL	Performance Level
QMS	Quality Management System
SIL	Safety Integrity Level
ToE	Target of Evaluation

Table 2: Abbreviations

1 Target of Evaluation (ToE)

In January 2022 the company Pilz GmbH & Co. KG requested TÜV SÜD Rail GmbH to test and certify the concept of the Maintenance Safeguarding Safe Access System Key In Pocket according to the standards listed in clause 3 of this report. The related project number is 717527204.

The ToE is a product used in safety related applications and its concept is intended to be approved for

- SIL 2 according to IEC 61508,
- Maximum SIL 2 according to IEC 62061, and
- PL d, Cat. 3 according to ISO 13849-1.

More details can be found in the technical reports “PO98963T V1.0” (concept report “Key In Pocket”), “PO99716T V1.0” (program block “Key In Pocket” for PNOZ multi 2) and PO100336T V1.0” (three function blocks “Key In Pocket” for PSS 4000) from TÜV SÜD Rail GmbH and in the following listed manuals from company Pilz GmbH & Co. KG:

- System description “Key-in-pocket”
- Application Note “PSSu Key-in-Pocket Basic”
- Application Note “PSSu Key-in-Pocket Extended”

2 Scope of Testing

2.1 Test Specimen

“Key In Pocket” is a Maintenance Safeguarding Safe Access System based on PITreader devices by Pilz GmbH & Co. KG.

Having a machine cell with a dangerous area protected e.g. by a fence, it is necessary to bring the machine to a safe shutdown if an operator needs to enter the dangerous area. Key In Pocket provides a solution for operators to authenticate themselves with a personal electronic key at the door. If an operator is authenticated, he can shut down the machine and open the door to enter the facility (see Figure 1). Other operators can additionally sign in with their personal keys and enter the facility, too. Only when all signed-in operators left the facility and signed out with their personal keys, the machine can be started.

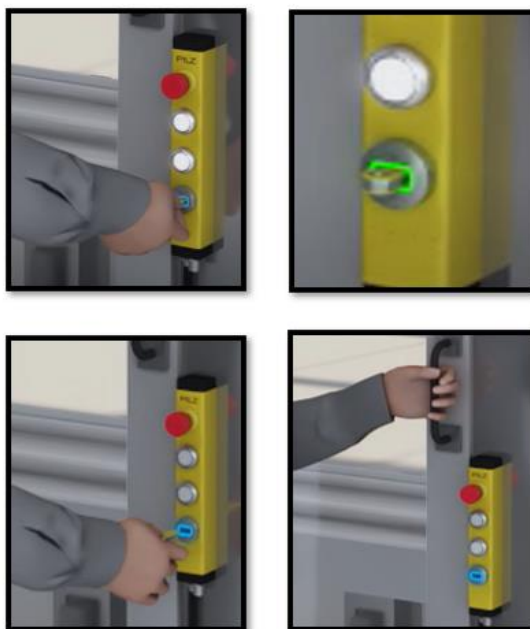


Figure 1: Overview of functionality of Key In Pocket

The safety function of the concept of “Key In Pocket” includes

- the identification of persons and
- the protection against accidental start-up as long as at least one operator is signed in.

The system Key In Pocket consists of one or multiple function blocks for functional safe control platforms like PSS 4000 or PNOZmulti, which are able to fulfil requirements according to IEC 61508, SIL 3 and ISO 13849-1, Cat. 4, PL e.

An overview of the system context can be seen in Figure 2.

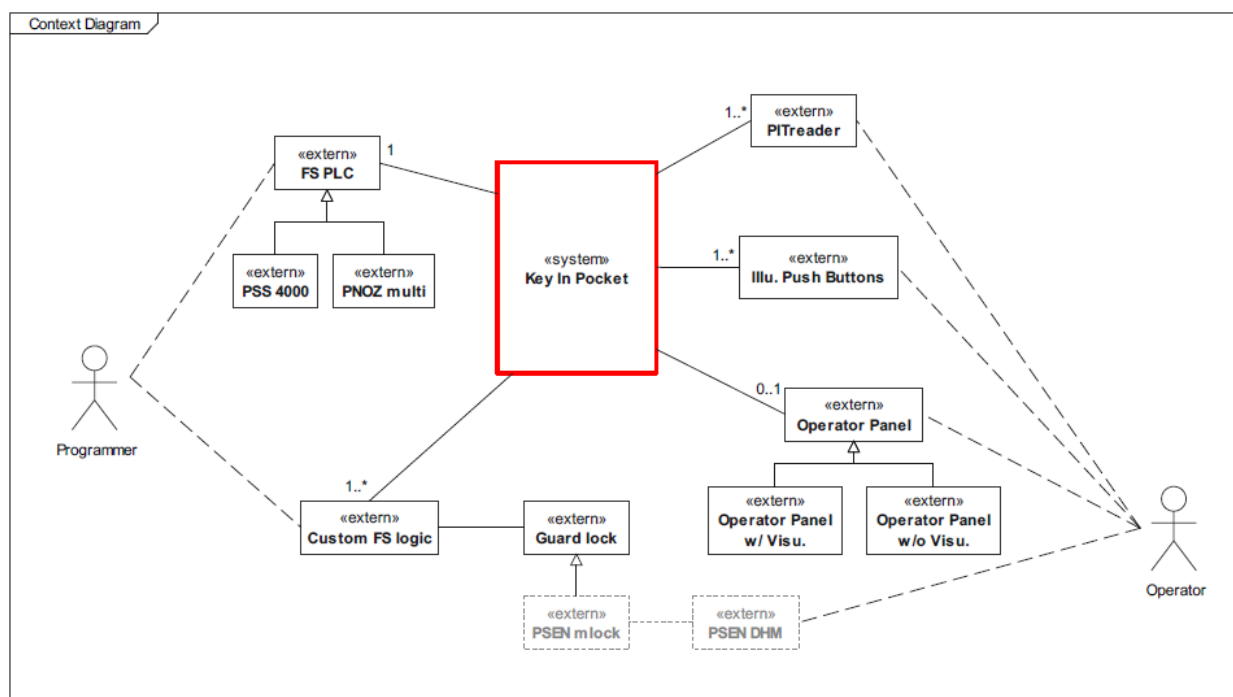


Figure 2: System context of Key In Pocket

2.2 Nomenclature and Identification of Key In Pocket

The product tested is identified by the nomenclature as follows:

Maintenance safeguarding system “Key-in-pocket”

2.3 Tests

The maintenance safeguarding system Key In Pocket was examined with respect to the following testing operations:

- I. Functional Safety including
 - Analysis of the system specification
 - Analysis of the system architecture (Block-Diagram-FMEA)
 - Analysis and testing of the FS-PLC function blocks PSS 4000
 - Analysis and testing of the FS-PLC function blocks PNOZmulti

3 Standards and Guidelines

The regulations and guidelines which form the basis of the type testing are listed below.

3.1 Functional Safety

No.	Reference	Description
/N1/	IEC 61508-1:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems – Part 1: General requirements
/N2/	IEC 61508-2:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems – Part 2: Requirements for electrical/electronic/ programmable electronic safety-related systems
/N3/	IEC 61508-3:2010	Functional safety of electrical/electronic/programmable electronic safety-related systems – Part 3: Software requirements
/N4/	IEC 62061:2021	Safety of machinery - Functional safety of safety-related electrical, electronic and programmable electronic control systems
/N5/	ISO 13849-1:2015	Safety of machinery - Safety-related parts of control systems Part 1: General principles for design

Table 3: Basic safety standards

3.2 Quality Management System

No.	Reference	Description
[M1]	QMS	Quality Management System TÜV SÜD Rail GmbH
	TR_RA_P_04.50	Test Program Functional Safety & Cybersecurity TR_RA_P_04.51 Definition Scope of testing TR_RA_P_04.07 Product Modification TR_RA_P_04.52 Concept Phase & Safety Lifecycle TR_RA_P_04.53 Detail Phase Hardware TR_RA_P_04.54 Detail Phase Software TR_RA_P_04.55 Safety Manual TR_RA_P_04.56 Result of Testing
[M2]	D-PL-11190-08-00	DAkkS accreditation according to DIN EN ISO 17025:2018 / EN ISO/IEC 17025:2017

Table 4: Quality Management System

4 Summary

The test results showed that the maintenance safeguarding system Key in Pocket (see ToE), as specified in clause 2.1, is able to fulfil the requirements of the standards and guidelines referenced in clause 3.

Technical Certifier

Project Manager