THE GATEKEEPER
MAN - MACHINE SAFEGUARDING NEWS FROM SCHMERSAL THE DNA OF SAFETY
JULY 2021

ENHANCING TAMPER RESISTANCE VIA "HIGH" CODING

Are your safety control measures associated with guard door monitoring meeting ISO14119 specifications? Have you taken the necessary steps outlined within ISO14119 to not only select and implement your safety devices but to also reduce the chances of your safety control systems from being bypassed?

There are many factors to consider when designing machine safety control measures which aim to prevent exposure of identify risks. Whether to use hard guard fencing or personnel detection systems; locking or non-locking interlock devices; is the equipment in a heavy debris, cleanroom or hazardous atmosphere environment are just a few of the many factors to consider.

One important aspect which is often overlooked is applying the appropriate measure to help minimize bypassing of the installed safety controls. ISO 14119 is a safety standard which focuses on the principles for design and selection of interlock devices associated with hard guards. Part of this standard looks at what type of interlock you are using and provides different measures to help minimize bypassing if it has been concluded that a motivation to bypass safety exists.

Safety manufacturers of interlocking devices often utilize a default actuator key for a specific series of a switch. One way to prevent bypassing such safety switches is by installing it where it cannot be accessed, such as concealed within the frame of a machine. Another option is to utilize a device which offers High Coding.

ISO14119 categorizes a safety device actuator options by 3 different code descriptions. Low coding means that the safety device has 1 to 9 different possibilities for an actuator. Medium coding means that there are 10 to 1,000 different possibilities and typically applies to a trapped key safety system. For High Coding, there would be over 1,000 possibilities for an actuator. This means that the chances of obtaining a spare key to bypass a safety device which can easily be accessed is extremely rare.

According to ISO 14119, an additional measure to implement when using a High Coded device is to use tamper resistant fasteners on the actuator. This will further prevent the uniquely coded actuator from being removed from a guard to bypass a safety device.

ISO 14119 offers several different principles and measures against defeating safety devices, with High Coding actuator options considered as the least number of additional measures for interlocking devices having separate actuators.

Principles and measures	Type 1 interlocking device (operated only with simple actuator)	Type 1 interlocking device (operated only with high)	Type 2 interlocking device (operated only with simple actuator)	Type 2 interlocking device (operated only with high)	Type 3 interlocking device (see 5.2.3 b))	Type 4 interlocking device (see 5.2.3 c))
Mounting out the reach, see 7.2 a) 1)	X					
Barrier / shielding, see 7.2 a) 2)						
Mounting in hidden location, see 7.2 a) 3)			X			
Condition monitoring or periodic examination, see 7.2 d) 1) i) and ii)						
Non-releasable attachment of position switches and actuators, see 7.2 c)						
Non-releasable attachment of the position switch, see 7.2 c)		M				M
Non-releasable attachment of the actuating element, see 7.2 c)		M	M	M	M	M
Additional interlocking device and plausibility checks, see 7.2 d) 2)	R		R			

X The application of at least one of three measures is mandatory
M Mandatory measure
R Recommended measures (additional)

ISO 14119 - Safety of machinery — Interlocking devices associated with guards — Principles for design and selection;
Table 3 — Additional measures against defeating interlocking devices depending on type

SCHMERSAL PRODUCT SPOTLIGHT

Safety devices with "high" coding for tamper resistance

NEW: AZM40
ELECTRONIC SOLENOID INTERLOCK

With dimensions of 119.5 x 40 x 20 mm, the AZM40 is the smallest electronic solenoid interlock. It was designed to be fitted to standard extruded profiles used in guard door frames. The solenoid provides a 2000 N force to secure the guard door and uses a bi-stable principle, retaining the last lock status in case of power removal. An RFID sensor is also integrated, providing the option of individual coding, for enhanced tamper resistance.

Innovations
Tech Brief
Brochure
Online product catalog
Video: Product Animation (YouTube)
Video: Product Demo (YouTube)

NEW: AZM150
ELECTROMECHANICAL SOLENOID INTERLOCK

The AZM150 is an electromechanical solenoid interlock in a slim design. The slim housing was designed to match the aluminum profiles used in many machine guard doors. The rotatable head is locked in place by the front cover and offers some mounting flexibility. The solenoid lock provides 1500 N force to secure the machine guard. Available with individually coded actuators via an independent cam system.

Innovations
Tech Brief
Brochure
Online product catalog
Video: Product Animation (YouTube)

MORE ELECTRONIC SAFETY SWITCHES

The use of RFID allows for high level coding of non-contact switches because each actuator is assigned a unique number which is read by the sensor. The I1 variants allows only one actuator to be assigned. The I2 versions allow for the actuator to be replaced, overriding the previous actuator.

RSS16 Safety sensor
RSS36 Safety sensor
RSS260 Safety sensor
AZ201 Keyed interlock
AZM201 Solenoid interlock
AZM300 Solenoid interlock
AZM400 Motorized bolt lock

MORE ELECTROMECHANICAL SAFETY SWITCHES

These are special versions of our traditional safety switches. They reach HIGH level coding by offering several separated internal cams which are individually set and will only actuate with the unique matching actuator key included. Schmersal is the only manufacturer that offers electro-mechanical safety devices with high level coding.

AZ16-Zi Keyed interlock
AZ17-Zi Keyed interlock
AZM161-Zi Solenoid interlock
AZM170-Zi Solenoid interlock

RESOURCES

Here is a collection of reference documents on the topic of ISO 14119 and High level coding

TECH BRIEF
High Level Coded Devices

Schmersal offers a wide selection of electromechanical and electronic safety devices available with individual coded actuators, coding level "high" per ISO 14119 .

Download the Tech Brief

ARTICLE
Interlocking Device Design

This article summarizes the key principles for design and selection of interlocking devices according to the international standard ISO 14119

Download the Article

BROCHURE
ISO 14119 Guide

This brochure can aid designers of machinery and plants with standard-compliant design of moveable guards, taking into consideration ISO 14119 and other relevant regulations.

Download the brochure

WEBINAR:
Building A Machine Safety Mindset

Avoid inconsistent machine safety methodologies amongst EHS, Engineering design, and maintenance professionals in a workplace. This 1 hour webinar discusses the steps of building a machine safety mindset to achieve a more uniform company machine safety policy.

Register for the webinar recording
Download the Executive Summary

ENGINEERING SERVICES

tec.nicum Engineering Services can provide assistance with tamper resistance

SAFETY TRAINING
OSHA 10 hour & 30 hour course

In the OSHA Outreach Training Program for general industry you will learn about workplace hazards and your rights. This course covers more than just machine safety, and includes fire protection, egress, PPE, HAZCOM, and fall protection, among other topics.

Learn more

SAFETY TRAINING
General Machine Safety Course

Our full day course covers the basics of machine safeguarding and provides an understanding of legal requirements, risk assessment, types of hazards, and available types of safety equipment. Learn how they all come together for a complete machine safeguarding solution.

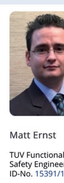
Learn more

ENGINEERING SERVICE
Risk Assessment to ISO 12100

Based on ISO 12100, tec.nicum specialists carry out risk analysis and a comprehensive assessment of all hazards relating to the machines and systems. They also analyze machines for conformity with the applicable standards and norms.

Learn more

ASK THE EXPERT

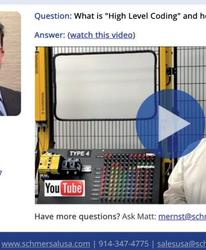


Matt Ernst

TUV Functional Safety Engineer
ID-No. 15391/17

Question: What is "High Level Coding" and how do I apply it?

Answer: (watch this video)



Have more questions? Ask Matt: mernst@schmersal.com