SAFEMASTER STS
Safety switch- and key interlock system actuator module K and E

Translation of the original instructions

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Content

Before installing, operating or maintaining this device, these instructions must be carefully read and understood.

The installation must only be done by a qualified electrican!

The installation must only be done by a qualified mechanic!

Do not dispose of household garbage!
The device must be disposed of in compliance with nationally applicable rules and requirements.

Storage for future reference.

To help you understand and find specific text passages and notes in the operating instructions, we have important information and information marked with symbols.

Symbol and Notes Statement

DANGER:
Indicates that death or severe personal injury will result if proper precautions are not taken.

WARNING:
Indicates that death or severe personal injury can result if proper precautions are not taken.

CAUTION:
Indicates that a minor personal injury can result if proper precautions are not taken.

INFO:
Referred information to help you make best use of the product.

ATTENTION:
Warns against actions that can cause damage or malfunction of the device, the device environment or the hardware / software result.

General Notes

The product hereby described was developed to perform safety functions as a part of a whole installation or machine. A complete safety system normally includes sensors (SAFEMASTER STS System), evaluation units, signals and logical modules for safe disconnections. The manufacturer of the installation or machine is responsible for ensuring proper functioning of the whole system. DOLD cannot guarantee all the specifications of an installation or machine that was not designed by DOLD. The total concept of the control system into which the device is integrated must be validated by the user. DOLD also takes over no liability for recommendations which are given or implied in the following description. The following description implies no modification of the general DOLD terms of delivery, warranty or liability claims.

Notes

Risk!
Danger to life or risk of serious injuries.

- Hazards must be ruled out before a key can be entered and the movable part of the guard can then be opened!

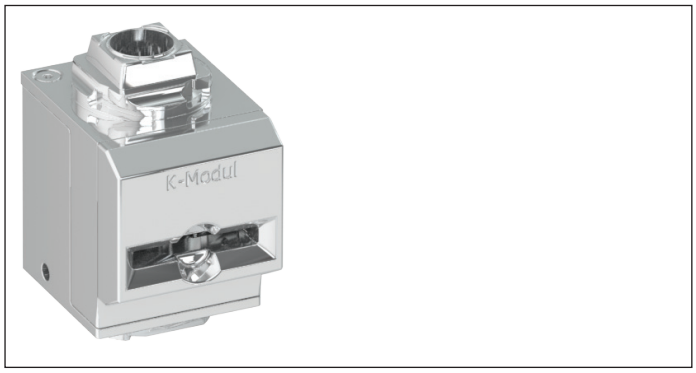
INFO

- For information regarding use in the system and validation according to EN ISO 13849-2, see SAFEMASTER STS application guide.
- Take advantage of the advice of the **E. DOLD & SÖHNE KG** specialists regarding the choice of units and combination of a system.

ATTENTION !

- To avoid wrong usage (e.g. by overload, mounting position or usage in acid, alkaline or other hostile ambient conditions) the limitations of the product have to be observed. Please check in advance if your application requires the usage of the more robust stainless steel model of SAFEMASTER STS. The requirements of the mounting and operating instruction must be fulfilled.

SAFEMASTER STS
Safety switch- and key interlock system
Actuator module K and E



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STS-System Benefits
- EU-Test certificate according to the directive 2006/42/EG, annex IX
- For safety applications up to PLe/Cat. 4 according to DIN EN/ISO 13849-1
- Modular and expandable system
- Rugged stainless steel design
- Wireless mechanical safeguarding
- Combines the benefits of safety switch, locking module and key transfer in a single system
- Easy installation through comprehensive accessories
- Protection against lock-in
- Coding level low, medium, high according to DIN EN ISO 14119:2014-03

Features
- Actuator module with an insertion opening
- Module expansions possible below and above the module
- Can be coded
- Choice of direction in 4 increments of 90°
- Module with (compared to actuator models B and D) inverted function
- Especially suited for difficult installation positions or additional actuator monitoring

Product Description

Actuator modules K and E are assembled together with other modules into an STS unit and used in connection with an actuator. The actuator modules are then always part of the STS unit and connected with the stationary part of a separating guard while the actuator is mounted to the movable part of a separating guard.
The actuator modules can be installed in 4 positions on the STS unit, each turned by 90°.

ATTENTION!

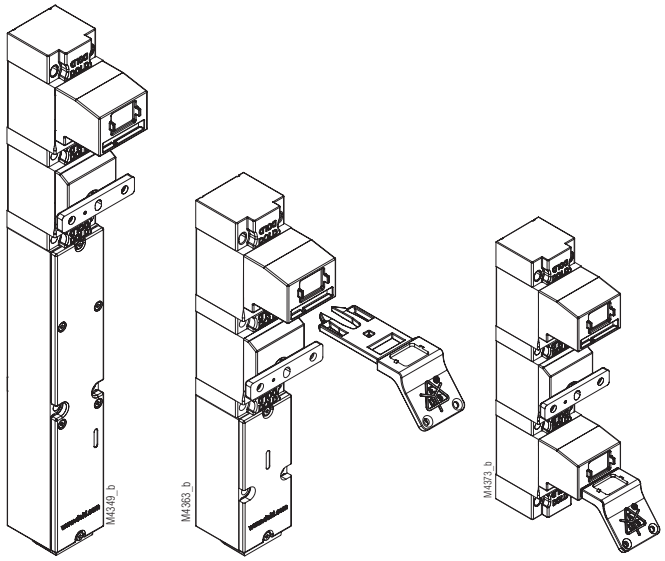
Mechanical function modules can be installed above and/ or below the key module!

Electrical modules can only be installed below the key module!

Approvals and Markings

CE TÜVRheinland CERTIFIED Functional Safety Type Approved www.tuv.com ID 0600000000 TÜVRheinland C US

Installation Examples



YRHK01M RXK01M M10K01M

Design and Function

The actuator module K offers the option of inverting SAFEMASTER STS functions. Externally, it is identical to the actuator module B, but it has an inverse direction of action. This feature allows for an inverse structure of STS units with other monitoring functions. Standard STS units and inverse functional units can be combined in a key transfer system without any problem.

Example for inverting a function
With the mechanical interlock M10A the unlocking of the actuator in the actuator module A takes place by the introduction of the matching key into the key module 10. The actuator module is then positioned above the key module.

The MK01M unit has the same functionality. However, with this unit the actuator module K with inverting function is located below the key module 01. For some local conditions this design sequence may be beneficial.

All technical data in this list relate to the state at the moment of edition. We reserve the right for technical improvements and changes at any time.

Function Inversion with Electrical Monitoring Option

Apart from the sequential inversion of the modules used in the module combination the integration of the actuator module K offers an electrical monitoring option of the actuator. If, for example, a guard door position shall not only be monitored mechanically but also electrically, the RXK01M is the suitable unit. To unlock the actuator, the matching key must be inserted into the key unit above. Only after that can the actuator be removed. With the actuator removal several contacts of the switch module RX are actuated at the same time.

In contrast to the RXK01M the switch contacts with the normally functioning SX10A unit monitor the key insertion and not the removal of the actuator. Therefore there is no possibility of checking with this unit whether the access was actually opened.
The contacts of switch module RX can be used both as signal contacts and safety feature. With a safety-related contact the use of a safety switching device with changeover contact principle or antivalence switching is required.

When using the actuator module K with inverting function, the other functions such as key change are preserved. The identification of the STS unit is done from the bottom to the top as always. However, the operating sequence is inverted.

Function Inversion with Locking Modules

The actuator module K can also be combined with solenoid lock module, for instance, the YRH.
In this case the solenoid lock module no longer works as a door closure but rather unlocks mechanically functioning units for actuator removal. This combination is suitable for systems with a very high risk of being locked in where escape unlocking cannot be used; it is also used for escape sluices. The contacts of the solenoid lock module YRH can be used both as signal contacts and safety-related. With a safety-related contact the use of a safety switching device with changeover contact principle or antivalence switching is required.

Example YRHK01M
This STS unit functions similar to the MK01M, but the actuator can only be inserted into the actuator module if a signal is applied to the solenoid of the locking module unit.

Example YRHK11M
This STS unit functions similar to the MK11M, but the actuator can only be inserted into the actuator module when a signal is applied to the solenoid of the solenoid lock unit. After that the key can be changed.

Circuit Diagrams (Example RXK01M)

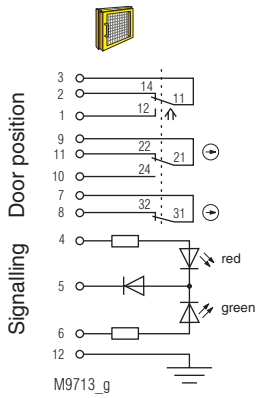


Fig. 1:
Locking module activated:
Key (top) removed,
Actuator (bottom) inserted,
Door closed

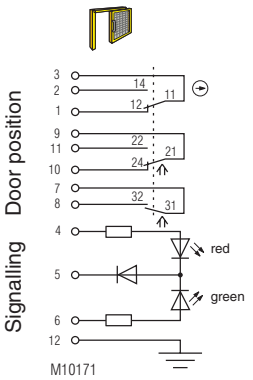


Fig. 2:
Locking module deactivated:
Key (top) inserted,
Actuator (bottom) removed
Door unlocked and open

Switching logic

			Fig. 1	Fig. 2
Door contacts	3	2	■	
	3	1		■
	9	11	■	
	9	10		■
	7	8	■	

■ closed
□ open

Circuit Diagrams (Example YRHK01M)

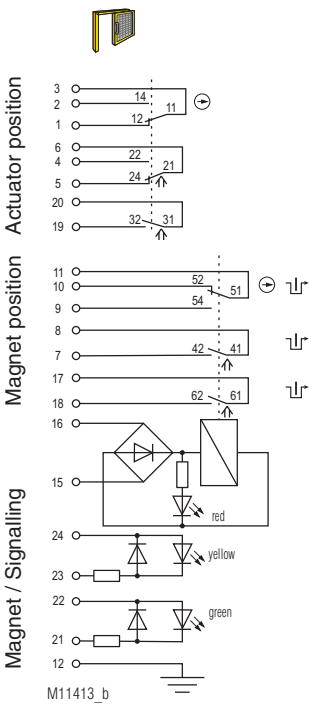


Fig. 3:
- YRXKM:
  Switch in active state, actuator inserted, locking mechanism unlocked
- YRXK01M:
  Guard locking in activated state, actuator inserted, locking mechanism unlocked

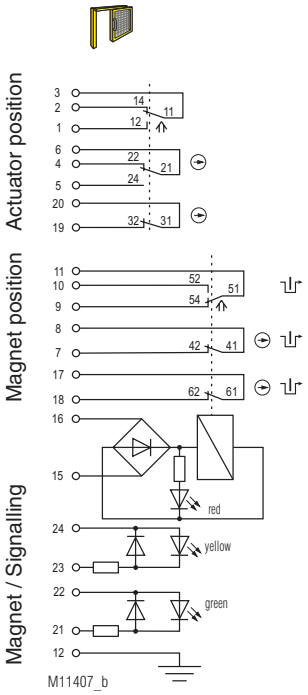


Fig. 4:
Switch in activated state:
- YRXKM:
  Locking mechanism locked, actuator removed
- YRXK01M:
  Key inserted, actuator removed, locking mechanism activated

Circuit Diagrams (Example YRHK01M)

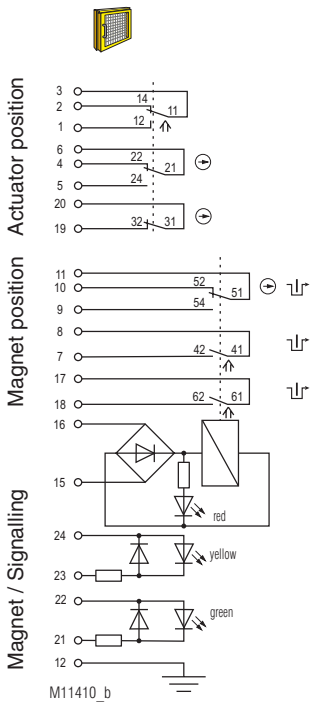


Fig. 5:
Switch in deactivated state:
- YRXKM:
  Locking mechanism unlocked, actuator removed
- YRXK01M:
  Guard locking in deactivated state, key inserted, locking mechanism unlocked, actuator removed

YRHKM, YRHK01M

Mechanical switch positions			Fig. M1		
Circuit diagram			Fig. 1	Fig. 2	Fig. 3
Door contacts	3	2		■	■
	3	1	■		
	6	4		■	■
	6	5	■		
	19	20		■	■
Locking mechanism	11	9		■	
	11	10	■		■
	7	8		■	
	17	18		■	
Control signal	De-energized on trip				
	15	16			
	Open circuit operation				

■ closed

□ open

The state shown in **Figure 5** depends on the control signal of the solenoid.
If the control signal is present and the actuator is plugged in, the guard locking falls in the state shown in **Figure 3**. If no signal is present and the actuator is plugged in, the guard locking is set to the state shown in **Figure 4**.

Technical Data

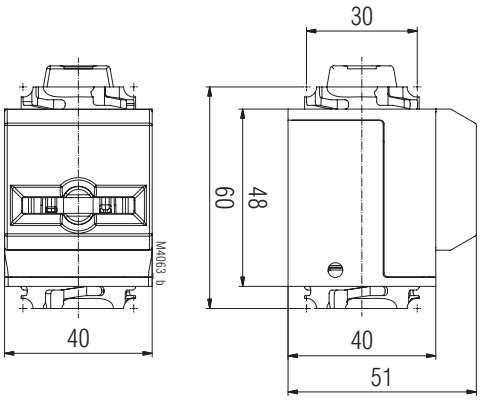
Mechanical Data

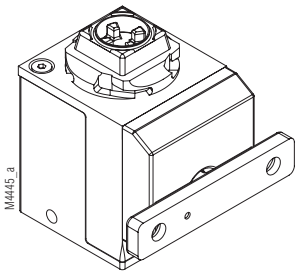
Enclosure:	Stainless steel V4A / AISI 316 / AISI 630 1 Key insertion opening
Locking force:	F_{zh} 4000 N (in a locked unit e.g MK01M)

General Data

Temperature range:	- 25°C to + 60°C
Storage range:	- 25°C to + 60°C
Application:	only as part of a unit of the SAFEMASTER STS series

Dimensional Drawings [mm]





Alternative STS Units

The following overview shows some examples of Alternative STS Units with normal and inverted functions:

normal	**inverted**
M10A	MK01M
M11A	MK11M
M12A	MK21M
M10B01M	M10K01M
M10B02M	M20K01M
RX10A	RXK01M

The units specified offer the same functions, only the operating sequence is different. In the event of switch / locking modules the monitored module logically changes.

Diagnostic Coverage (DC)

When using an actuator module K or E above an electrical STS module such as switch module RX or solenoid locking module YRH, the diagnostic coverage (DC value) needs to be determined by the mechanical STS module only in the first step.
To determine the diagnostic coverage of a STS unit with inverted function an overview of the functionally identical STS units with normal function is provided in **Alternative STS Units**. The respective diagnostic coverages can be found in the SAFEMASTER STS design guide.

The diagnostic function of the electrical STS module is to be considered as 1 or 2-channel system, depending on the design of the circuits. The DC value of the mechanical STS component is included in the calculation of the diagnostic coverage according to EN ISO 13849-1 to assess the key transfer function as subsystem. For more information on this subject refer to the SAFEMASTER STS design guide.

Variants and Accessories

Actuator module E with coded actuator
The actuator module K can also be designed with a coded actuator just as the actuator module B. The delivery of the actuator module and the actuator is always done in pairs. Different types of code available. The coding used will not be identified on the actuator. Additional delivery and separate orders of components are not possible. The type designation of the coded actuator module E.
Example: ME01M
Coding level medium according to DIN EN ISO 14119:2014-03

Devices with several actuators
If several actuators are needed for an application, for instance, for the implementation of categories 4 or 3, several actuator modules K can also be installed next to each other. However, they cannot be connected with an actuator module A as is the case with normally functioning versions.
An example of an STS unit with double actuator is the MKK01M or the RXKK01M. When connecting two actuator modules, care should be taken that the introduction of both actuators into the associated actuator modules takes place at the same time. As an option, the bottom actuator can be introduced first and then the top one later. If the actuators are both coded the same, it has no significance for the assembly and function of the STS unit.

Ordering Designation

Actuator module K
Article number: 0062326

Actuator module E
Article number: 0064978

Safety Related Data

Data suitable for the PFH_D summation method according to EN ISO13849-1:2016				
Data according to EN ISO13849-1:2016	K-Modul / E-Modul			
Category	2	3	3	4
PL	d	d	e	e
PFH_D	1,061E-09	6,84592E-09	5,4469E-09	1,00122E-10
T_{10D}	20	20	20	20
CCF required	65 ...100	85 ...100	85 ...100	85 ...100
B_{10d}	2×10^6	2×10^6	2×10^6	2×10^6
d_{op} (d/a)	365	365	365	365
h_{op} (h/d)	24	24	24	24
t_{cycle} (h)	1	1	1	1
n_{op}	8760	8760	8760	8760
Diagnostic coverage DC	60 %	60 %	90 %	99 %
Test interval according to ISO14119	1 / year	1 / year	1 / month	1 / month

Category 2: The prerequisites for installation and integration into a category 2 architecture must be met

Category 3: The prerequisites for installation and integration into a category 3 architecture must be met

Category 4: The prerequisites for installation and integration into a category 4 architecture must be met, in particular 2 actuators must be used

PFH_D: A single module has no function. As a result, an individual module cannot have any safety-related characteristic values. The safety-related characteristic data in the table only serve to determine the values of a unit into which it is integrated.

When used as part of a **key transfer system**:

- PFH_D total STS system = SUM PFH_{D1} + … PFH_{Dn}
- Lowest category of a module = category of whole STS system
- Lowest DC of a module = DC entire STS unit

If the design of a unit is changed, the safety-related data may also change.