



SAFEMASTER STS Safety Switch- and Key Interlock System Locking Module ZRX, ZAX and ZRH

Translation
of the original instructions



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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 GmbH & Co. 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.



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



The installation must only be done by a qualified electrician!



The installation must only be done by a qualified mechanic!



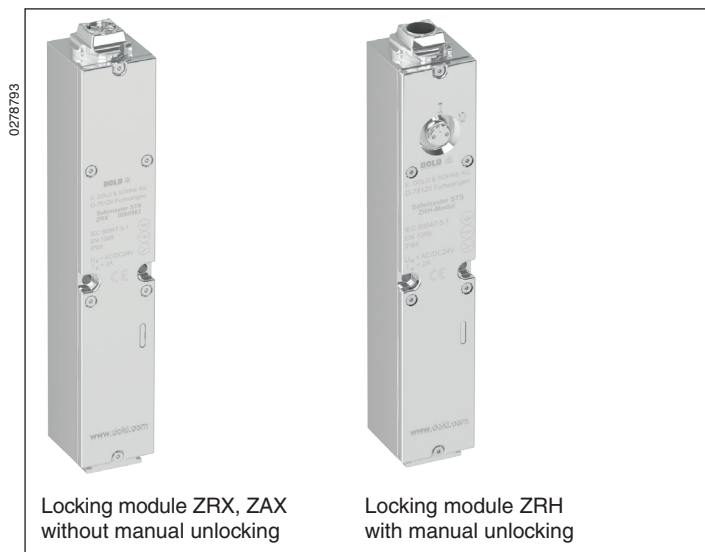
Do not dispose of household garbage!
The device must be disposed of in compliance with nationally applicable rules and requirements.



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.

SAFEMASTER STS Safety Switch- and Key Interlock System Locking Module ZRX, ZAX and ZRH



Locking module ZRX, ZAX
without manual unlocking

Locking module ZRH
with manual unlocking

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

- Locking module to monitor
 - Actuator and key position
 - Doors and entries
 - Locking module position
- Module expansions possible only above the module
- Standby current or load current principle
- Optionally with manual unlocking
- With integrated LEDs for status indication

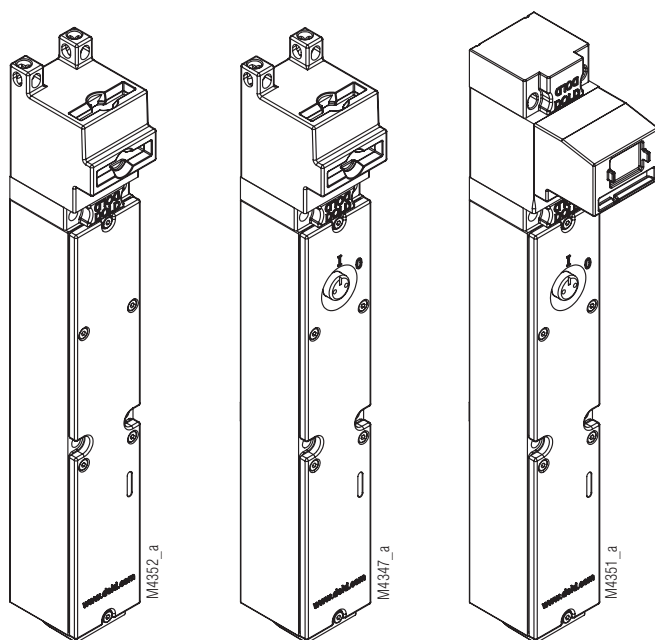
Product Description

Locking modules ZRX, ZAX and ZRH are assembled with other modules to an STS unit. They serve as a solenoid lock of separating guards on machines, e.g. with cycle and overrun times or other hazards which may still be present even following access queries. It must therefore be ensured that there is no hazard remaining when removing the actuator or key and access can be unlocked.

Approvals and Markings



Installation Examples



ZAXA

ZRHA

ZRH01M

Design and Function

An extremely robust and flexible solenoid lock, which monitors the safe position of one or more entries in a system, for instance, of a guard or protective door. For this purpose the module is used in combination with other mechanical modules, for instance, actuator, key and/or padlock module. The key and padlock modules can only be installed above the locking module.

The entries can only be released after the safety of the plant for the operating personnel has been ensured.

The locking modules ZRX, ZAX and ZRH with manual unlocking can also be used without actuator module only for releasing keys in a key interlock system. This function is used in key interlock systems with central shut-off or shut-off outside the system, for instance in Ex zones, with strong vibration or dirt build-up, etc.

When installing one of the modules e.g. key module 01, 01S, padlock module V, actuator module B, D or A above a locking module ZRX and/or ZRH, their release only takes place after applying a control signal to the magnet of the locking module. If emergency or escape unlocking is required, please refer to data sheet locking module ZRN, ZAN and ZRF.

Indication

- | | |
|-------------------|-------------------------|
| LED red: | Magnet energized |
| LED yellow/green: | Separately controllable |

Circuit Diagrams (Example ZRH01BM)

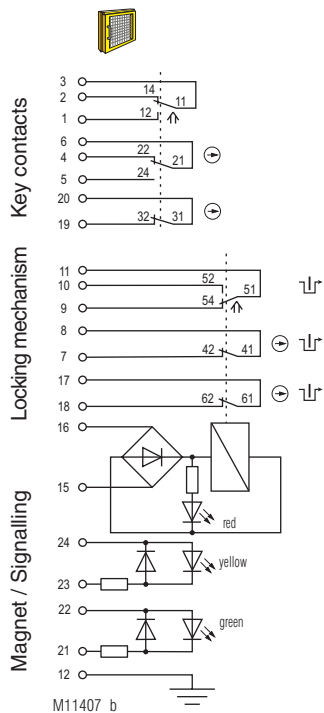


Fig. 1:
Locking module activated:
Magnet locked, key and actuator
inserted,
Door closed

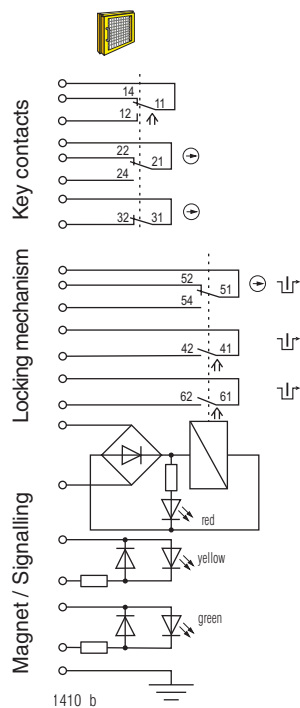


Fig. 2:
Locking module deactivated:
Magnet released, key and
actuator inserted,
Door closed

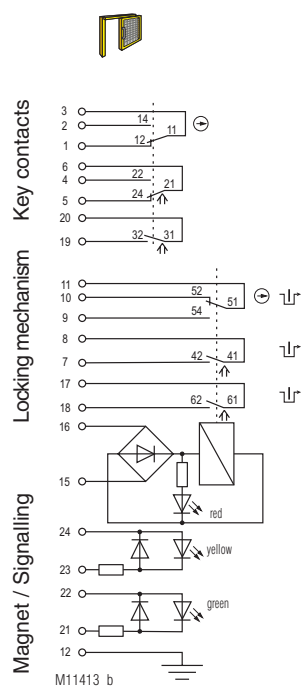


Fig. 3:
Locking module deactivated:
Magnet released, key and
actuator removed,
Door open

ZRH01A, ZRH01BM

Switching logic				
Switching cycles		Fig. 1	Fig. 2	Fig. 3
Key contacts	3	2		
	3	1		
	6	4		
	6	5		
	19	20		
Locking mechanism	11	9		
	11	10		
	7	8		
	17	18		
Magnet / Signalling	Standby current principle U_N			
	15	16		
	Load current principle U_N			
	15	16		
		closed		
		open		

The state shown in **Figure 3** does not depend on the control signal of the magnet.
If the control signal is applied and the key removed the lock changes to the state of **Figure 2**.
If no signal is applied and the key is removed the lock changes to the state of **Figure 1**

Technical Data

Mechanical Data

Mechanical principle:	Rotating axis with redundant actuation and mechanical interlock
Enclosure:	Stainless steel V4A / AISI 316L
Internal parts:	Stainless steel V4A / AISI 316 (acc. to EN 10027-2; 1.4401; 1.4404; 1.4542; 1.4301; 1.4310)
Locking force:	F_{zh} 4000 N
Degree of protection:	IP 65
Locking module principle:	Failure locking-proof
Magnetic principle:	Standby current or load current
Operating speed min. / max.:	100 / 500 mm/s

Input

Nominal voltage U_N (Measured nominal voltage):	AC/DC 24 V
Nominal voltage range:	0.85 ... 1.1 U_N (see solenoid derating graph)
Power consumption:	5.5 W

Output

Contacts	
Door position:	1 NC contact, 2 antivalent changeover contacts
Locking mechanism:	2 NC contacts + 1 changeover contact
Switching element:	IEC EN 60947-5-1 Appendix K
Switching principle:	Changeover contact with forced opening spring contact
Contact material:	Ag / AgSnO ₂
Max. switching frequency:	360/h
Max. operating current	
De-energized on trip:	2 A
Energized on trip:	1 A
Utilization category of switching elements	
to AC 15:	1 A
to DC 13:	0.5 A
Electrical service life:	5 x 10 ⁶ switching cycles
Short circuit strength, max. fusing:	2 A gG
Conditional rated short-circuit current: (rated conditional short circuit current):	1000 A
Mechanical life:	1 x 10 ⁶ switching cycles

General Data

Operating mode	
Mechanical life:	100% ED
Temperature range	
Standby current principle:	- 25°C to + 60°C
Load current principle:	- 25°C to + 60°C
Storage temperature:	- 40°C to + 80°C
Rated impulse voltage:	0.8 kV
Rated insulation voltage:	≤ 50 V
Overvoltage category:	III
Pollution degree:	2
Connection:	Cage clamp terminals
Cross sections min. / max.:	0.25 / 0.75 mm ² (with ferrules and sleeve according to DIN 46228-4)
Cable entry with thread:	1 x M20x1.5
Intended use:	Up to max. cat. 4, PL e according DIN EN ISO 13849-1
Mounting:	According to DIN EN 50041
Test principles:	DIN EN ISO 13849-1:2015 DIN EN ISO 14119:2014-03 DIN EN 60947-5-1:2017 GS-ET-15:2015-05 GS-ET-19:2015-05 GS-ET-31:2010-02

Safety Related Data

Data suitable for the PFH_D summation method according to EN ISO13849-1:2016

Data according to EN ISO13849-1:2016	Locking Module ZRX, ZAX and ZRH			
Category	2	3	3	4
PL	d	d	e	e
PFH _D	1,061E-09	6,84592E-10	5,44569E-10	1,00122E-10
T _{10D}	20	20	20	20
CCF required	65-100	85-100	85-100	85-100
B _{10d}	2.000.000	2.000.000	2.000.000	2.000.000
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.

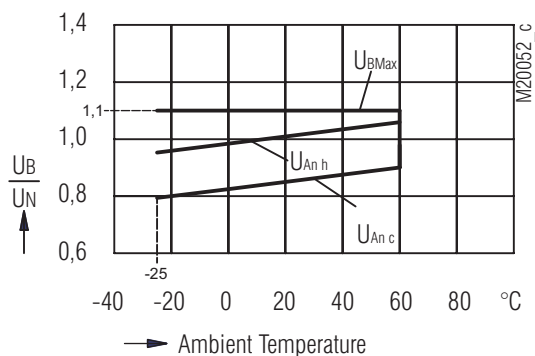
When used as part of a **key transfer system**:

- 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.

Solenoid Derating graph



U_{BMax} maximum power supply dependent upon temperature
 U_{An c} response voltage at coil temperature = ambient temperature
 U_{An h} response voltage at preceding agitation at 1.1 x U_N

Variants

Locking module ZRX

Locking module, de-energized on trip, without additional functions.

Locking module ZAX

Locking module, energized on trip, without additional functions.

Locking module ZRH

Locking module, de-energized on trip, manual unlocking.
 In the case of electrical faults, for instance, during power failure, the manual unlocking allows the mechanical release of an access from outside the dangerous area with the help of a tool.
 With the actuation of the manual unlocking, the circuits on terminals 7 and 8; 9 and 11 as well as 17 and 18 will be cut off at the same time and contact between 10 and 11 will be closed. Opening of these circuits must generate an emergency-stop.

The manual unlockings are not sealed or lead-sealed because of the typically rugged applications. When using a locking module with manual unlocking we therefore recommend combining it with acoustic and also visual warning signals and to provide additional locking on the control level.

Locking modules YRX and YRH

For applications where the key modules 10, 10S or an actuator module K, E or padlock module W shall be installed above the locking module, the YRX, YAX and YRH versions are available. Additional information about the circuit diagram and use of the locking modules YRX, YAX and YRH is available in the data sheet locking module YRX, YAX and YRH as well as in data sheets actuator module K and E.

Function Selection / Versions

Locking module	Selectable functions		
	Standby current	Load current	Manual unlocking
STS-ZRX	X		
STS-ZAX		X	
STS-ZRH	X		X

Important Notes

Function differences of locking modules with load current principle and locking modules with standby current principle.

Locking modules based on the standby current principle are in de-energized condition when in the locked position. This must be remembered especially when examining faults such as power failure or wire break.

Only when the safety evaluation shows, that a solenoid lock with closed circuit operation is not suitable or is not required, a solenoid lock with open circuit operation can be used.

Contrary to the locking modules based on the standby current principle locking modules based on the load current principle lock only when the circuit is closed. The locking modules unlock if the circuit opens with the load current principle.

If a locking module is used based on the load current principle terminals 7 and 8 or 17 and 18 must be included in the safety circuit.

Manual unlocking

If misuse of the manual unlocking must be suspected a locking module based on the standby current principle without manual unlocking can also be used as an alternative. In the event of a power interruption the locking module must be unlocked in this case by removing the cover and subsequently pushing back the magnetic tappet (refer to the SAFEMASTER STS Installation and Operating Instructions).

A locking module based on the load current principle with manual unlocking is not available since it releases in the event of a power interruption.

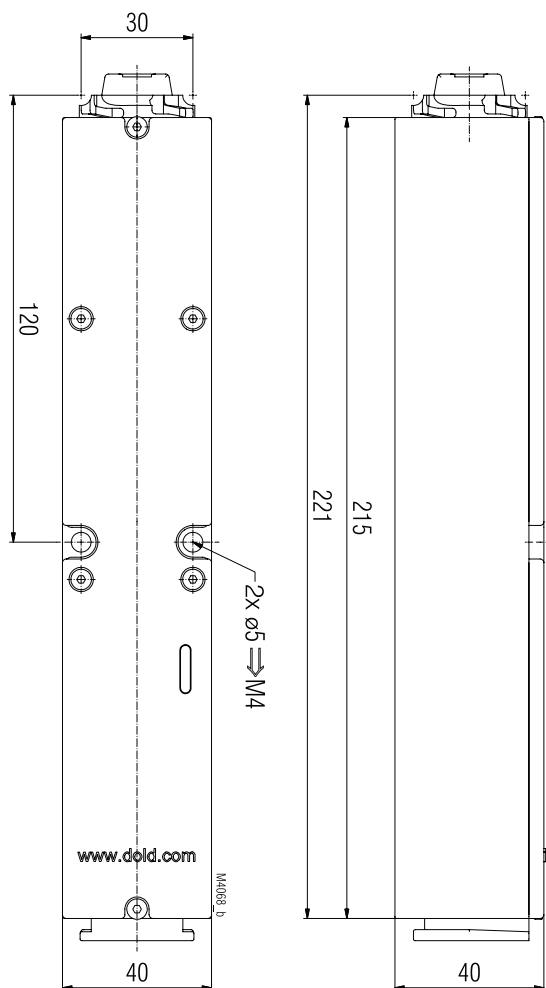
Ordering Designation

Locking module ZRX
 Article number: 0060982

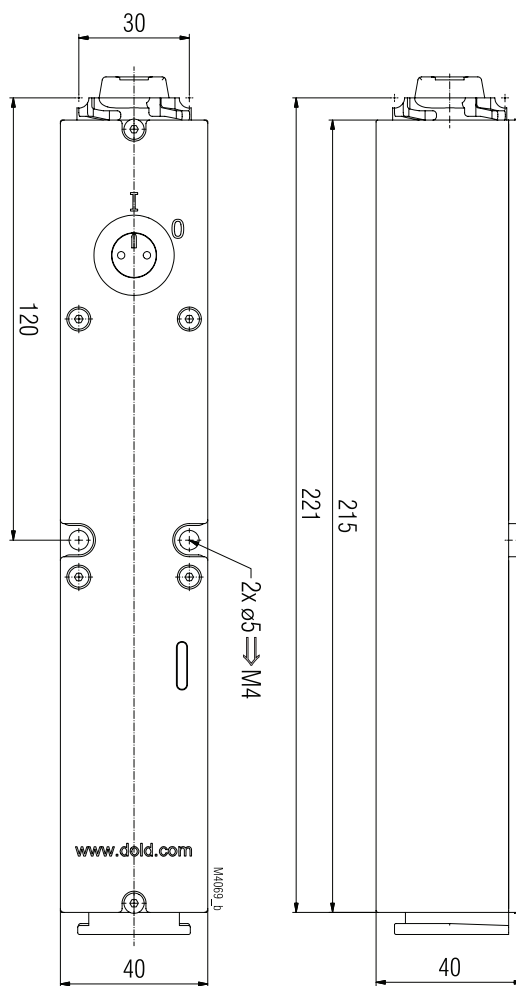
Locking module ZAX
 Article number: 0063406

Locking module ZRH
 Article number: 0060983

Locking module ZRH cover
 Article number: 0065273



Locking module ZRX, ZAX without manual unlocking



Locking module ZRH with manual unlocking

