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

Translation of the german original

0274035

Locking module ZRX/K, ZAX/K
without emergency unlocking

Locking module ZRH/K
with emergency unlocking

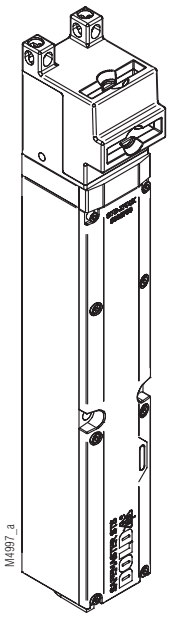
STS/K-System Benefits

- EU-Test certificate according to the directive 2006/42/EG, annex IX
- For safety applications up to PLe/Category 4 according to EN ISO 13849-1
- Modular and expandable system
- Rugged composite version of stainless steel and plastic design
- Wireless mechanical safeguarding
- Combines the benefits of safety switch, solenoid locking 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

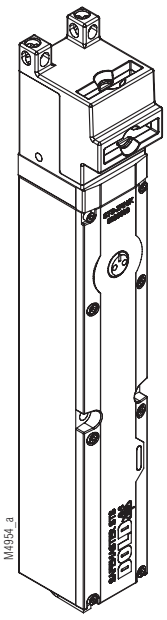
Features

- 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
- This modules are also available in stainless steel

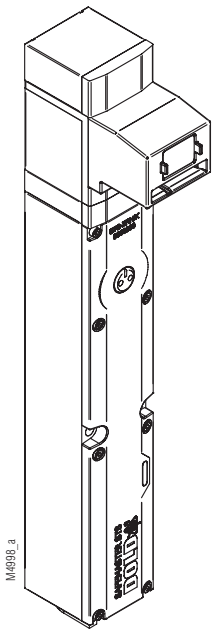
Installation Examples



ZAXA/K



ZRHA/K



ZRH01M/K

Approvals and Markings

CE TÜVRheinland CERTIFIED Product Safety Functional Safety www.tuv.com ID 0600000000

Application

Locking modules ZRX/K, ZAX/K and ZRH/K are assembled with other modules to an STS/K 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.

Design and Operation

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/K, ZAX/K and ZRH/K 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/K, 01S/K, padlock module V/K, actuator module B/K or A/K above a locking module ZRX/K and/or ZRH/K, 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/K and ZAN/K.

Circuit Diagrams (Example YRH10A/K)

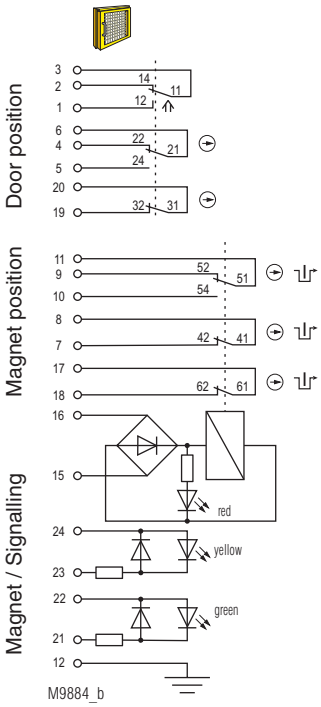


Fig. 1:
Locking module activated:
Magnet locked,
key and actuator inserted,
Door closed

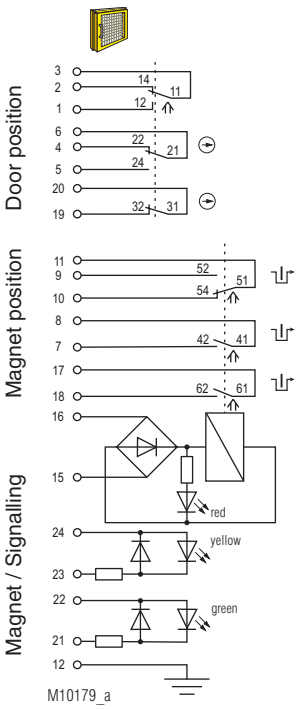


Fig. 2:
Locking module deactivated:
Magnet released,
key and actuator inserted,
Door closed

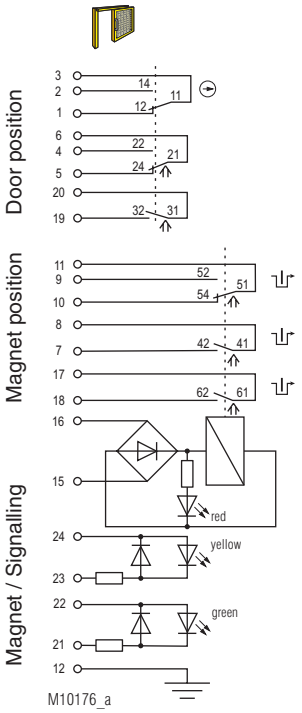


Fig. 3:
Locking module deactivated:
Magnet released,
key and actuator removed,
Door open

			Fig. 1	Fig. 2	Fig. 3
Door contacts	3	2	■	■	
	3	1			■
	6	4	■	■	
	6	5			■
	19	20	■	■	
Magnet contact	11	9		■	■
	11	10	■		
	7	8	■		
	17	18	■		
Control signal Magnet	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 inserted the solenoid locking changes to the state of **Figure 2**.
If no signal is applied and the key inserted the solenoid locking changes to the state of **Figure 1**

Technical Data

Enclosure:	PA + GF
Internal parts and inserting slots:	Stainless steel V4A / AISI 316 / AISI 630
Degree of protection:	IP 65
Temperature range standby current principle:	- 25 °C to + 38 °C
Temperature range load current principle:	- 25 °C to + 38 °C
Storage temperature:	- 25 °C to + 60 °C
Mechanical principle:	Rotating axis with redundant actuator
Connection method:	Cage clamp terminals
min. connection cross-section:	0.25 mm²
max. connection cross-section:	0.75 mm²
Cable entry:	1 x M20 x 1.5
$B10_d$:	2 x 10^6 switching cycles
Electrical service life:	5 x 10^6 switching cycles
Locking force:	min. 2000 N
Shearing force:	depending on actuator
Locking module principle:	Standby current, failure locking-proof
Magnetic principle:	Standby current or load current
min. operating speed:	100 mm/s
max. operating speed:	250 mm/s
max. switching frequency:	360/h
Operating mode:	100% ED
Nominal voltage U_N:	AC/DC 24 V
Nominal voltage range:	0.85 ... 1.1 U_N (see solenoid derating graph)
Power consumption:	6 W
Rated impulse voltage:	0.8 kV
Rated insulation voltage:	≤ 50 V
Overvoltage category:	III
Pollution degree:	2
Max. operating current Standby current principle:	2 A
Load current principle:	1 A
Contacts Door position:	1 NC contact, 2 diverse changeover contacts
Magnet position:	2 NC contacts + 1 changeover contact
Switching principle:	Changeover contact with forced-opening snap-action switch
Utilization category of switching elements to AC 15:	1 A
to DC 13:	0.5 A
Contact material:	Ag / $AgSnO_2$
Short circuit strength, max. fusing:	2 A gG
Rated conditional short circuit current:	1000 A
Indicator:	LED red/green, separate selection possible
Test principles:	EN ISO 13849-1:2008 DIN EN ISO 14119:2014-03 EN 60947-5-1:2005 GS-ET-15:02.2011 GS-ET-19:02-2011 GS-ET-31:02-2010
Intended use:	up to max. cat. 4, PL e according to EN ISO 13849-1
Mounting:	according to DIN EN 50041
Contact elements:	IEC EN 60947-5-1 Appendix K
Diagnostic coverage (DC):	see data sheets STS/K basic units and STS design guide

The diagnostic coverage of the units based on the locking module ZAX/K (load current principle) corresponds to the SAFEMASTER STS/K units based on the switch modules SX/K. **Refer to the Important Notes at the end of this data sheet.**

Protection against faults joint cause:	see table in STS design guide
Repair and replacement:	by manufacturer only
Test intervals::	
for PL a to d:	min. once a year
for PL e:	min. once at month

Technical Data

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.

Variants

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

Locking module ZRH/K
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 module ZAX/K
Locking module, energized on trip, without additional functions.

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

Function selection / Versions

	Selectable functions		
Locking module	Standby current	Load current	Manual unlocking
ZRX/K	X		
ZRH/K	X		X
ZAX/K		X	

Important Notes

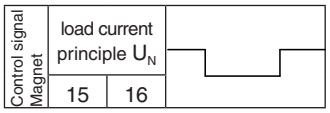
Function differences of locking modules with load current principle and locking modules with standby current principle.

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.
See DIN EN ISO 14119:2014-03 Abs. 5.7.1.

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.

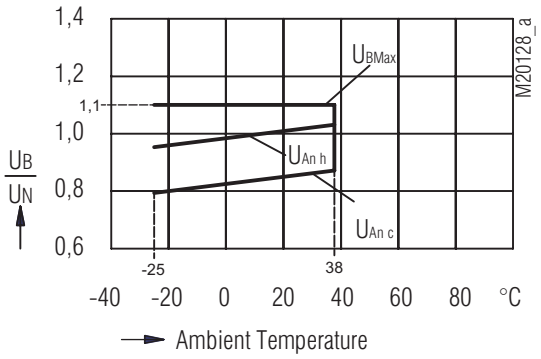
If a locking module is used based on the load current principle terminals 7 and 8 or 17 and 18 must be included in the safety circuit.
With the load current principle the control signal for the magnet is inverted (see switching logic).



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/K Installation and Operating Instructions).

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

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 Un

Ordering Designation

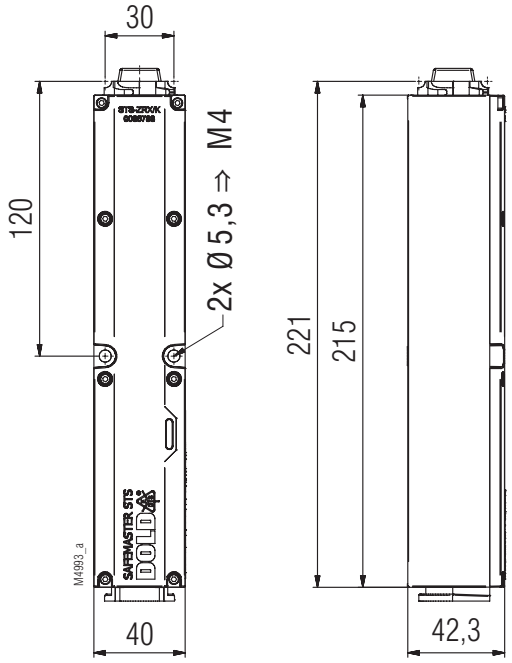
Locking module ZRX/K
Article number: 0066788

Locking module ZRH/K
Article number: 0066833

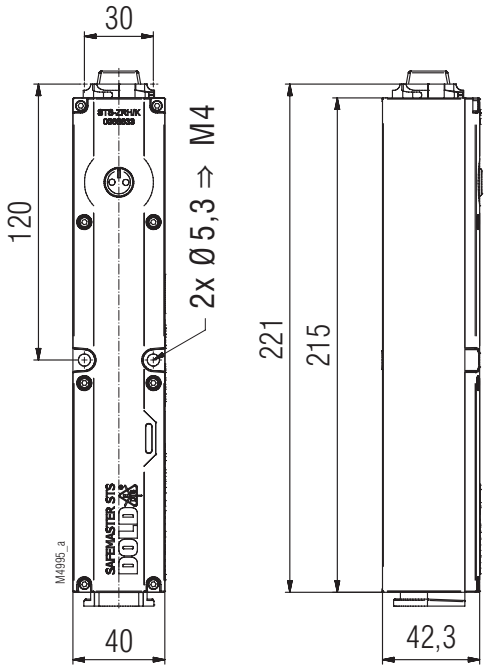
Locking module ZRH/K-cover
Article number: 0067004

Locking module ZAX/K
Article number: 0066985

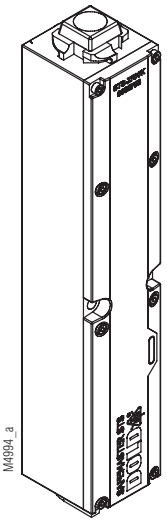
Dimensional Drawing [mm]



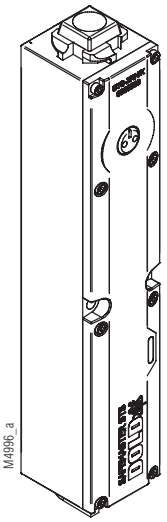
Locking module ZRX/K, ZAX/K without manual unlockin



Locking module ZRH/K with manual unlockin



ZRX/K, ZAX/K



ZRH/K,