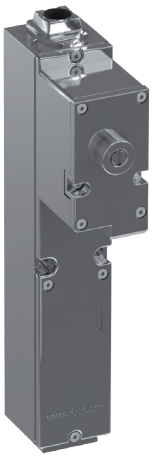
# SAFEMASTER STS
# Safety Switch- And Key Interlock System
# Locking Module STS-ZRN, STS-ZRF, STS-ZAN

**Preliminary data sheet**

0266393

Locking module STS-ZRN, STS-ZAN with emergency unlocking



Locking module STS-ZRF with escape unlocking

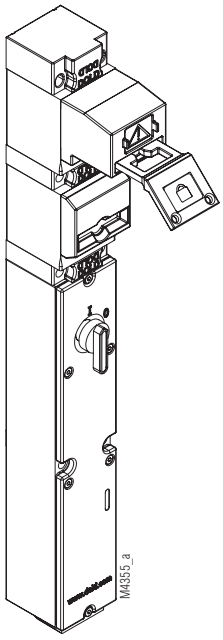
## STS-System Benefits

- TÜV certificate according to the legal and standard requirements
- For safety applications up to PLe/Category 4 according to 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

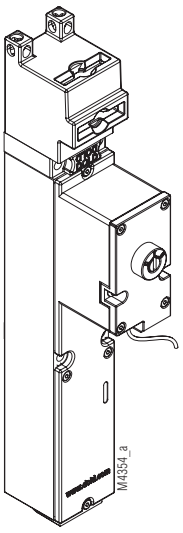
## Features STS-ZRN, STS-ZRF and STS-ZAN

- Locking module for monitoring doors and entries
- Optionally with emergency or escape unlocking
- Standby current (ZRN) or load current principle (ZAN)
- Status indication by integrated LEDs
- Separate monitoring of actuator / key position and locking module position
- Escape unlocking including 10 m pull cable, shroud tensioner, chain and spring

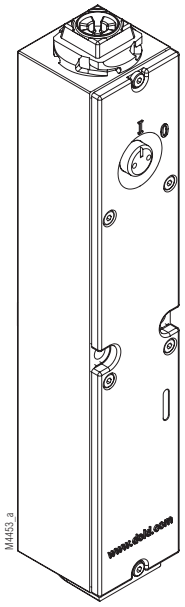
## Installation Examples




STS-ZRNDVM




STS-ZRFA




STS-ZRFB01M

## Approvals and Marking

CE, 1) TÜVRheinland Functional Safety Type Approved FS

1) applied for

## Application

Locking modules STS-ZRN, STS-ZRF and STS-ZAN are assembled with other modules to an STS unit. They serve as a solenoid lock of separating guards on machines with cycle or overrun times or other hazards, which may still be present even after the access query. 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

Extremely rugged and flexible solenoid lock monitoring the safe position of an access in the system. For this purpose the modules are used in combination with other mechanical modules, for instance, actuator, key and/or padlock modules.

Access can only be released after the safety of the equipment has been ensured for the operating personnel.

With STS-ZRN and STS-ZRF an access can only be opened when a signal is applied to the magnet. In addition, both modules offer protection against lock-in. In emergency situations a door can be opened through manual operation of the emergency release (STS-ZRN) or escape release (STS-ZRF) without a signal being applied to the magnet.

**ATTENTION!**

**Locking module STS-ZRF may not be used without actuator module only to release keys in a key interlock system.**

**Only the actuator modules STS-A, STS-B and STS-D may be installed above a Locking module STS-ZRF. Actuator modules STS-K and STS-E as well as key or padlock modules may never be installed since they would prevent the function of the escape release.**

However, key modules STS-01, STS-01S as well as padlock module STS-V can be installed above an actuator module STS-B or STS-D.

With the Locking module STS-ZAN an entry can be opened when no signal is applied to the magnet. In addition, this module offers possible protection against lock-in. A door can be released in emergency situations by manually operating the emergency release.

**ATTENTION!**

**This module may be used only in connection with the mechanical modules STS-01, STS-01S, STS-V or an actuator module STS-A, STS-B, STS-D. Combination with other mechanical STS modules is not permitted and may cause the unit to be blocked.**

## Circuit Diagrams for (example STS-ZRFA, ZRNA)

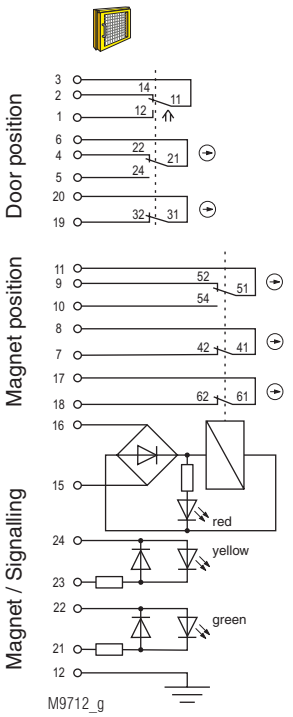



**Fig. 1:**
Locking module activated:
Magnet locked,
Actuator inserted,
Door closed

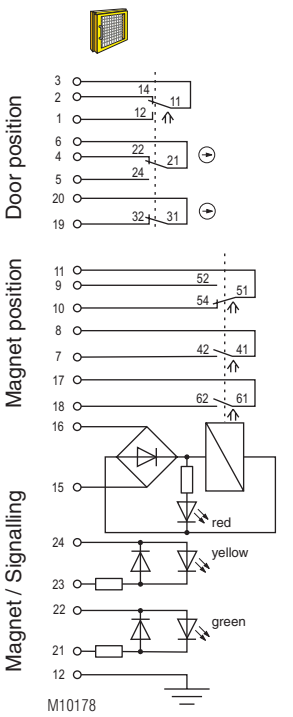



**Fig. 2:**
Locking module deactivated:
Magnet released,
Actuator inserted,
Door closed

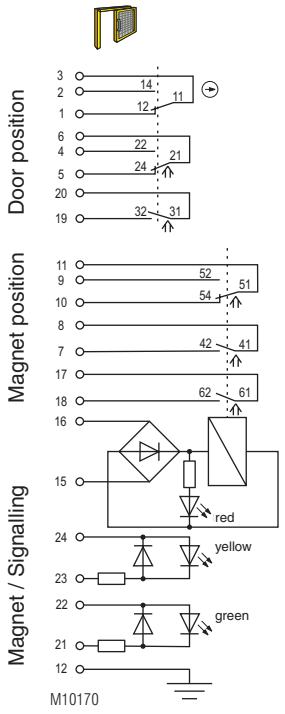



**Fig. 3:**
Locking module deactivated:
Magnet released,
Actuator removed,
Door open

Switching logic

| | | | 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 actuator inserted the locking module changes to the state of **Figure 2**.
If no signal is applied and the locking module is inserted the locking module changes to the state of **Figure 1**

## Technical Data

| | |
|---|---|
| Enclosure: | Stainless steel V4A / AISI 316L |
| Degree of protection: | IP 65 |
| Temperature range standby current principle: | - 25 °C to + 60 °C |
| Temperature range load current principle: | - 25 °C to + 40 °C |
| Storage temperature: | - 40 °C to + 80 °C |
| Mechanical principle: | Rotating axis with redundant actuation |
| Connection method: | Cage tension spring clamping |
| min. connection cross-section: | 0.25 mm² |
| max. connection cross-section: | 1.5 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. 1000 N depending onactuator and actuator module |
| Shearing force: | min. 1000 N depends on actuator |
| Locking module principle: | Failure locking-proof Standby current (STS-ZRN, -ZRF) Load current (STS-ZAN) |
| Magnetic principle: | Standby current or load current |
| min. operating speed: | 100 mm/s |
| max. operating speed: | 500 mm/s (by exception, 1500 mm/s is permitted) |
| max. switching frequency: | 360/h |
| Operating mode: | 100% ED |
| Nominal voltage $U_N$: | AC/DC 24 V |
| Nominal voltage range: | 0.85 ... 1.1 $U_N$ |
| Power consumption: | 6 W |
| Rated impulse voltage: | 0.8 kV |
| Rated insulation voltage: | < 60 V |
| Contacts door position: | 1 NC contact, 2 diverse changeovers contacts |
| Contacts magnet position: | 2 NC contacts + 1 changeover contact |
| Switching principle: | Changeover contact with forced-opening snap-action switches |
| max. operating current | |
| Standby current principle: | 2 A |
| Load current principle: | 1 A |
| Contact material: | Ag / $AgSnO_2$ |
| Short circuit strength, max. fusing: | 4 A gG |
| Indicator: | LED red: Magnet energized LED yellow/green (separate selection possible) |
| Test principles: | EN ISO 13849-1:2008 EN 1088+A2:2008 EN 60947-5-1:2005 GS-ET 19:04.2004 |
| Intended use: | up to max. cat. 4, PL e according to EN ISO 13849-1 |
| Installation: | according to DIN EN 50041 |
| Contact elements: | IEC EN 60947-5-1 Appendix K |
| Diagnostic Coverage (DC): | see data sheets STS basic units and STS design guide |

An estimation of the diagnostic coverage degree of the escape unlocking and emergency unlocking cannot be determined reliably. However, these functions have system characteristics according to category 3 when assembled correctly:
**A single undetected fault does not lead to a failure of the safety function!**

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

| | |
|---|---|
| Fault exclusions: | none |
| Protection against faults of common cause: | see table in STS design guide |
| Repair and replacement: | by manufacturer only |
| Test intervals: | semi-annually recommended min. once a year |

## Variants

**Locking module STS-ZAN**
Locking module, load current principle, emergency unlocking.
In emergency situations, for instance, in the event of confinement, the emergency release allows for the mechanical release of an access from outside the hazard area without the help of a tool.
With the actuation of the emergency release, 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. This opening of the circuits must generate an emergency-stop.

**Locking module STS-ZRN**
Locking module, standby current principle, emergency release.
Emergency unlocking in the Locking module STS-ZRN is equipped with a lever similar to the STS-ZAN. After operating the lever the locking module magnet is pressed down mechanically and the locking module function of the STS unit is unlocked. Especially for machines with overrun time this means that with the emergency release activated the access is open while the machine or plant still represents hazards. When using a locking module with emergency release we recommend combining it with acoustic and also visual warning signals and to provide additional locking on the control level.
When using the ZRN module within a dangerous area, it can also be used as an emergency release.

**Locking module STS-ZRF**
Locking module, standby current principle, escape release.
In emergency situations, for instance, in the event of confinement, the escape release allows for the mechanical unlocking of an access from inside the dangerous area without the help of a tool.
With the actuation of the escape release, 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. This opening of the circuits must generate an emergency-stop.

The unit based on the Locking module STS-ZRF is installed outside the danger area, e.g. on a door post. The actuator is fastened to the movable part of the door. Escape unlocking functions via a mechanism integrated in the locking module and connected to a stainless steel cable. If the tension of the stainless steel cable is increased or reduced the magnet of the locking module is pressed down. The locking module unlocks and generates an emergency-stop. Through the tensioning and the independent operating direction of the cable the STS-ZRF constantly monitors its own function.

The advantage of this version is that locked in persons can activate the escape function even from a larger distance, e.g. injured persons no longer able to reach the escape door. The stainless steel cable can also be routed through a machine enclosure without having to create major openings.

The locking module is unlocked by activating the escape release and a trapped person can escape from the hazard area. Especially for machines with overrun time this means that with the escape release activated the access is open while the machine or plant still represents hazards.
This is also important in regard to self-monitoring of the STS-ZRF Locking module. Since the stainless steel cable is constantly under tension when installed correctly, a cable break or detachment of the mounting elements can be detected and trigger the safety function (see installation instructions page 6, top). When using a locking module with escape release we recommend combining it with acoustic and also visual warning signals and to provide additional locking on the control level.

The scope of delivery includes a stainless steel cable (10 m), shroud tensioner and a return spring in addition to the unit/module. Additional accessories such as eyelets, return pulleys or mounting material are separately available.

**Attention!**

**Only the actuator modules STS-A, STS-B and STS-D may be installed above a Locking module STS-ZRF. Possible key or padlock modules may be installed only above the actuator modules STS-B or STS-D.**
**Actuator modules STS-K and STS-E as well as key or padlock modules may never be installed directly above these locking modules since they would prevent the function of the escape release.**

## Function Selection / Variants

| | Selectable functions | | | |
|---|---|---|---|---|
| Locking module | Standby current | Load current | Escape unlocking | Emergency release |
| STS-ZRN | X | | | X |
| STS-ZRF | X | | X | |
| STS-ZAN | | X | | X |

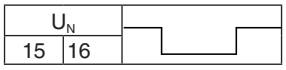
## Important Notes

**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.

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 plant represents a hazard in the event of a power failure, it must not be secured using a locking module based on the load current principle. In these cases a locking module based on the standby current principle must be used. Refer also to EN1088 1995 section. 3.4.
With the load current principle the control signal for the magnet is inverted.




## Ordering Designation

Locking module STS-ZRN
Article number: 0063841

Locking module STS-ZRN cover
Article number: 0063868

Locking module STS-ZRF
Article number: 0063272

Locking module STS-ZRF cover
Article number: 0063273

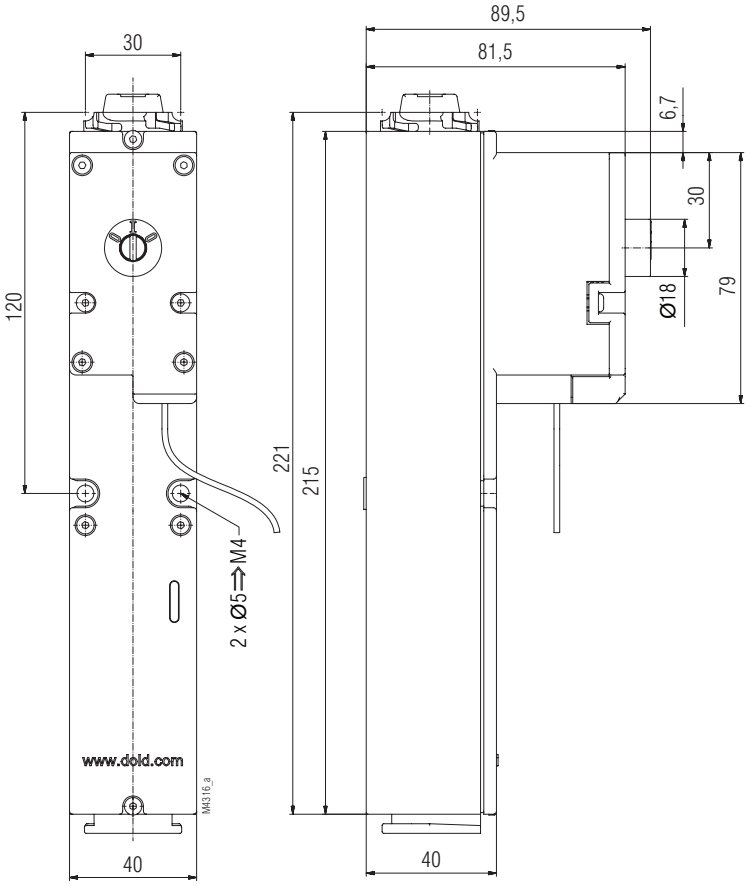
Locking module STS-ZAN
Article number: 0065621

## Accessories

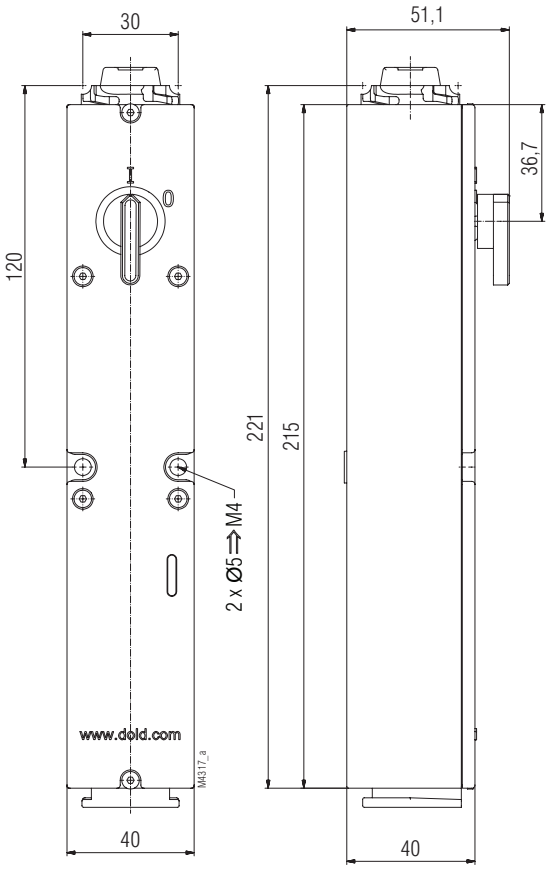
Eyebolt set
for STS-ZRF (4 pcs.): 0065198

Return pulley set
for STS-ZRF (2 pcs.): 0065199

## Dimensional Drawings [mm]

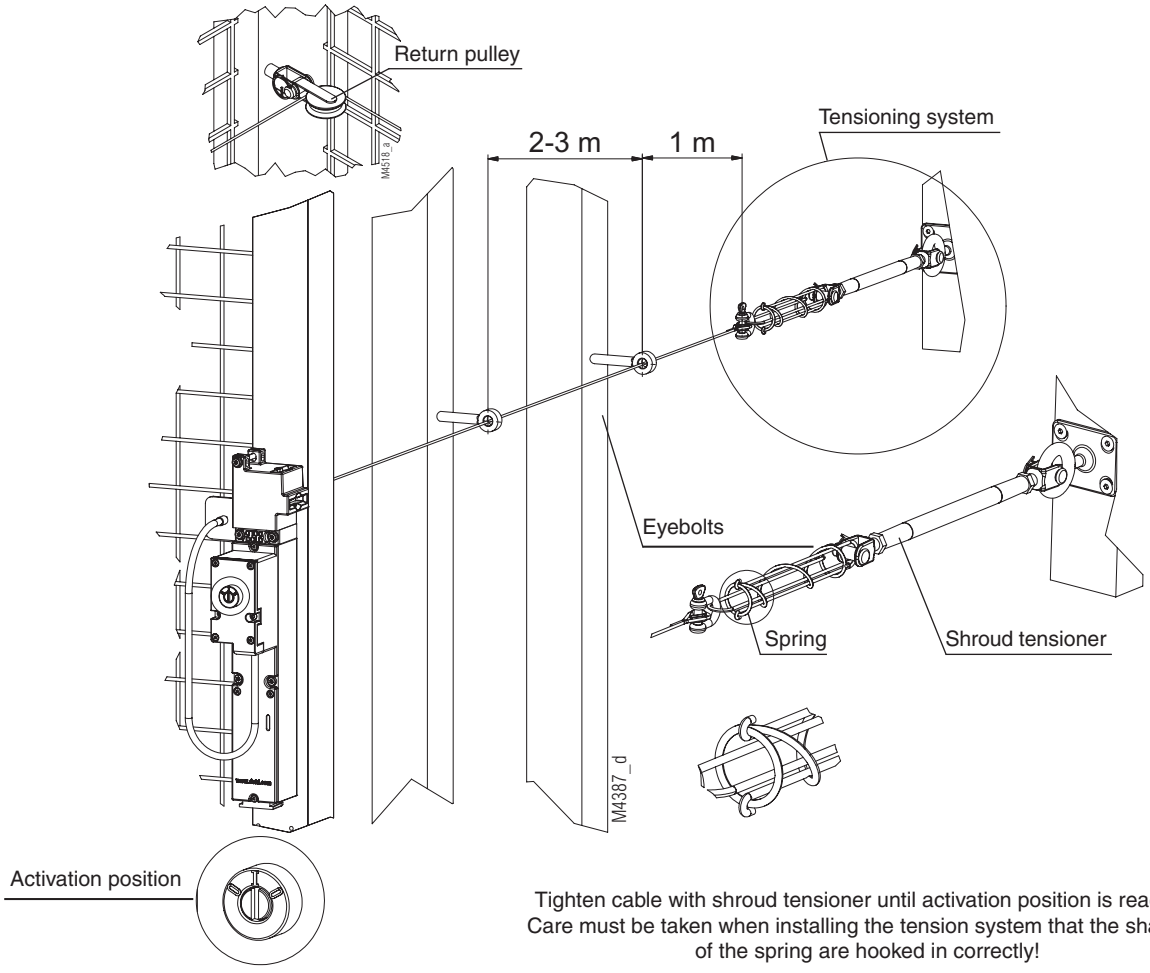



Locking module STS-ZRF with escape unlocking




STS-ZRN, STS-ZAN Locking module with emergency release

## Application Examples




Tighten cable with shroud tensioner until activation position is reached. Care must be taken when installing the tension system that the shackles of the spring are hooked in correctly!