

Advantages STS-Power Interlocking

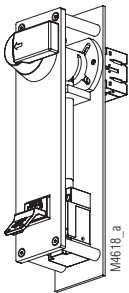
- EC Type test certificate according to the Machinery Directive 2006/42/EC, Annex IX
- For safety applications up to PLe/Category 4 according to EN ISO 13849-1
- Coding level low, medium and high according to DIN EN ISO 14119:2014-03
- It is ensured that the main switch is turned off before a machine can be entered.
- Machine is securely disconnected from mains with load isolation and secured against reclosure, e.g. during repair work.
- Secure locking even if auxiliary and control circuits fail
- The load isolator can be operated at all times with all versions to trigger an emergency stop (Stop 0)
- When using frequency converters with STO (Safe Torque Off) contactors are not required

Features

- Up to Performance Level (PL) e and Category 4 according to EN ISO 13849-1
- Emergency-off or zone stop
- High switching capacity, currents from 25 A to 800 A (AC23)

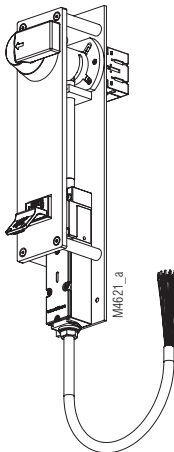
Additional Examples

Mechanical



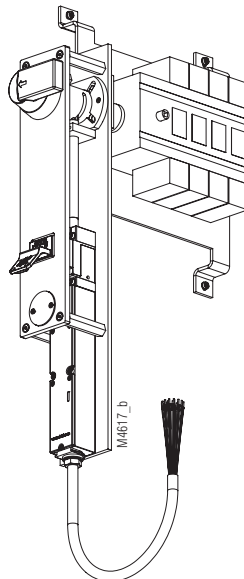
M10SL1PR40
(Load isolator,
front mounting)

Switch



SX01SLPR40
(Load isolator,
front mounting)

Solenoid locking



ZRH01SLPR250
(Load isolator,
side mounting)

Approvals and Marking



Function

Secure disconnection of machines and systems via a load isolator. Locking of the load isolator in switched-off condition.

Application

With key transfer systems there are two different types of disconnection:

Control interlocking

The machine is disconnected via electrical or electronic control for example, the machine is disconnected via contactors.

Power interlocking

A load isolator must be positively switched over before releasing a key. This ensures that the machine or system is securely disconnected from power. This type of disconnection does not depend on auxiliary or control circuits.

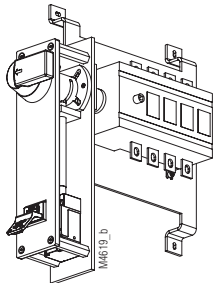
The electrical circuits built into the SAFEMASTER STS Power Interlocking systems for both tumbler or switch systems, are suitable for diagnostic monitoring by safety relays in Emergency stop circuits. Disconnection errors can then be detected and faulty operation can be prevented. In addition this forms a second channel which ensures reliable operation in the case of a fault.

The purely mechanical designs do not feature any diagnostic functions. They can therefore only be employed up to Performance Level (PL) c max. It is possible by adding additional STS units or Power Interlocking units with integrated electric diagnostic function to achieve Performance Level (PL) d or (PL) e.

Design and Working Principle

Mechanical

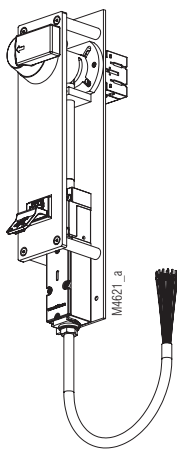
After the operating lever is turned to the off-position, the key can be removed. The locking mechanism prevents further operation of the load isolator while the key is pulled. 1 key can be removed. This design is suitable for applications where a machine can be disconnected directly (Stop 0), see application example 1. Without fault exclusion, Performance Level (PL) c is reached. If an STS delay unit e.g. YRX13M is positioned in the system between the mechanical solenoid locking e.g. M10LPR250 unit a Performance Level (PL) e can be achieved through the corresponding design of the monitoring circuits of this delay unit. With this measure, the application is also suitable for stop categories 1 and 2.



M10SL1PR250

Switch

The function is identical with the mechanical design. In addition, three contacts are positively switched when removing the keys. These contacts may be part of one or several safety-oriented circuits. In connection with the auxiliary contacts of the load isolator they monitor the safe function of the mechanics (see application example 2). Only 1 key can be removed. This design is suitable for applications where machines or systems come to an immediate stop after disconnection. Performance Level (PL) e / Category 3 can be achieved. By adding a logic unit, Performance Level (PL) e / Category 4 can also be achieved. For applications with stop categories 0, 1 or 2. For a solenoid locking unit must be added in the system with an associated monitoring function.



SX01SLPR40

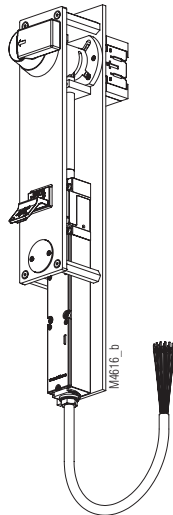
This design features a preassembled cable with stranded wires with a length of 2 m as standard. EMC protection must be provided by the customer.

For further information about connection and technical data of the switch, refer to the SX data sheet.

Solenoid locking

Design and Working Principle

The design with the solenoid system is similar in function to the switch system. However in addition the key must be released by the tumbler magnet. Only then can the key be removed. The solenoid locking magnet is monitored via 3 contacts which switch positively when the electromagnet picks up. These contacts may be part of one or several safety-oriented circuits (see application example 3 or 4). In connection with the auxiliary contacts of the load isolator they monitor the safe function of the mechanics. Only 1 key can be removed. This design is suitable for applications for the stop categories 0, 1 and 2 when connected with corresponding monitoring units. Up to Performance Level (PL) e / Category 4 can be achieved.



ZRH01SLPR40

This design features a preassembled cable with stranded wires with a length of 2 m as standard. EMC protection must be provided by the customer.

For further information about connection and technical data of the solenoid locking, refer to the ZRH data sheet.

Normative Consideration of the Components

Mechanical

The mechanical design features a 1-channel structure. Individual faults cannot be detected. Without fault exclusion, Performance Level (PL) c according to EN ISO13849-1 (see application example 1) can be reached as maximum.

Switch and solenoid locking

The designs with switch and solenoid locking can reach up to Performance Level (PL) e and Category 4, as additional circuits according to EN ISO 13849-1 are used.

Designs with solenoid locking function feature auxiliary release. This ensures that the key can be removed in the event of a power failure.

Operating lever

The operating lever is available in the two designs black/grey or red/yellow. The colour combination depends on the application. Red/yellow is used if the switch is also used as emergency-stop switch disconnecting a complete machine or system. The red/yellow version must always be freely accessible and operable. The black/grey design is used if only part of a machine or a partial section of a system is disconnected (zone stop).

Design of the load isolators

The load isolator are suitable for currents from 25 A to 800 A. They are always equipped with 4 NC with 2 additional auxiliary contacts (1NO, 1NC).

Versions and Combination Options

Different SAFEMASTER STS modules can be combined with different load isolators. This provides a variety of possible units and functions. The designation of the Power Interlocking units follows the scheme of the following table.

| Type | Power-interlocking | Operating lever | | Load isolator ABB OT Series | | | | | | | | | | | | | | | |
|-------------------------|--------------------|-----------------|------------|-----------------------------|----|----|----|----|-----|-----|-----|----------------|-----|-----|-----|---------------|-----|-----|--|
| | | Red/Yellow | Black/Grey | Load current [A] | | | | | | | | | | | | | | | |
| Mechanical | | | | | | | | | | | | | | | | | | | |
| M01L | P | R | B | 16 | 25 | 40 | 63 | 80 | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | |
| M20L1*) | P | R | B | 16 | 25 | 40 | 63 | 80 | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | |
| M30L1*) | P | R | B | 16 | 25 | 40 | 63 | 80 | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | |
| M40L1*) | P | R | B | 16 | 25 | 40 | 63 | 80 | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | |
| M50L1*) | P | R | B | 16 | 25 | 40 | 63 | 80 | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | |
| Switch | | | | | | | | | | | | | | | | | | | |
| SX01L | P | R | B | 16 | 25 | 40 | 63 | 80 | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | |
| Solenoid locking | | | | | | | | | | | | | | | | | | | |
| ZRH01L | P | R | B | 16 | 25 | 40 | 63 | 80 | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | |
| | | | | | | | | | | | | front-mounting | | | | side-mounting | | | |

*) on request

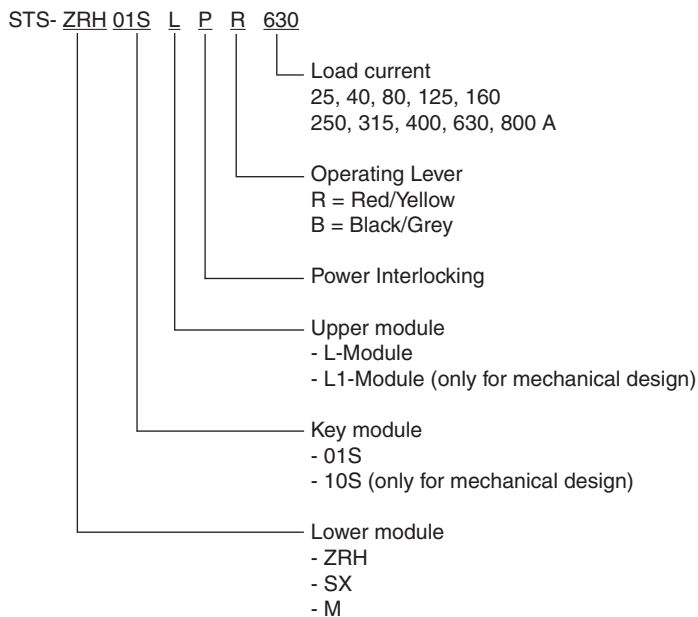
Data sheets

STS switch module SX/SV
 STS solenoid locking modules ZRH
 STS key module 01/10
 Refer to the ABB data sheet for the data on the load isolator chosen



Let the specialists of **E. DOLD & SÖHNE KG** assist you with their advice regarding the selection of the units and combination of a system.

Ordering Example



Technical Data

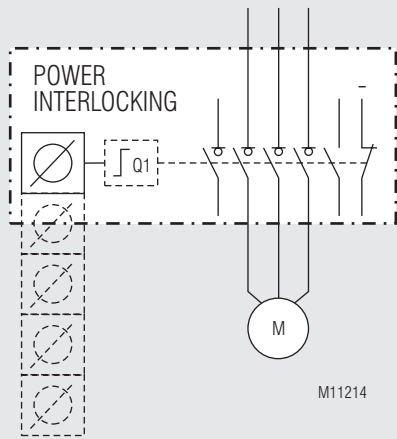
| | |
|----------------------------|----------------------------|
| Load isolator | |
| Number of contacts: | 4 NC |
| Auxiliary contacts: | 1 NO contact, 1 NC contact |
| Test intervals: | |
| for PL a to d: | min. once a year |
| for PL e: | min. once a month |

ATTENTION!



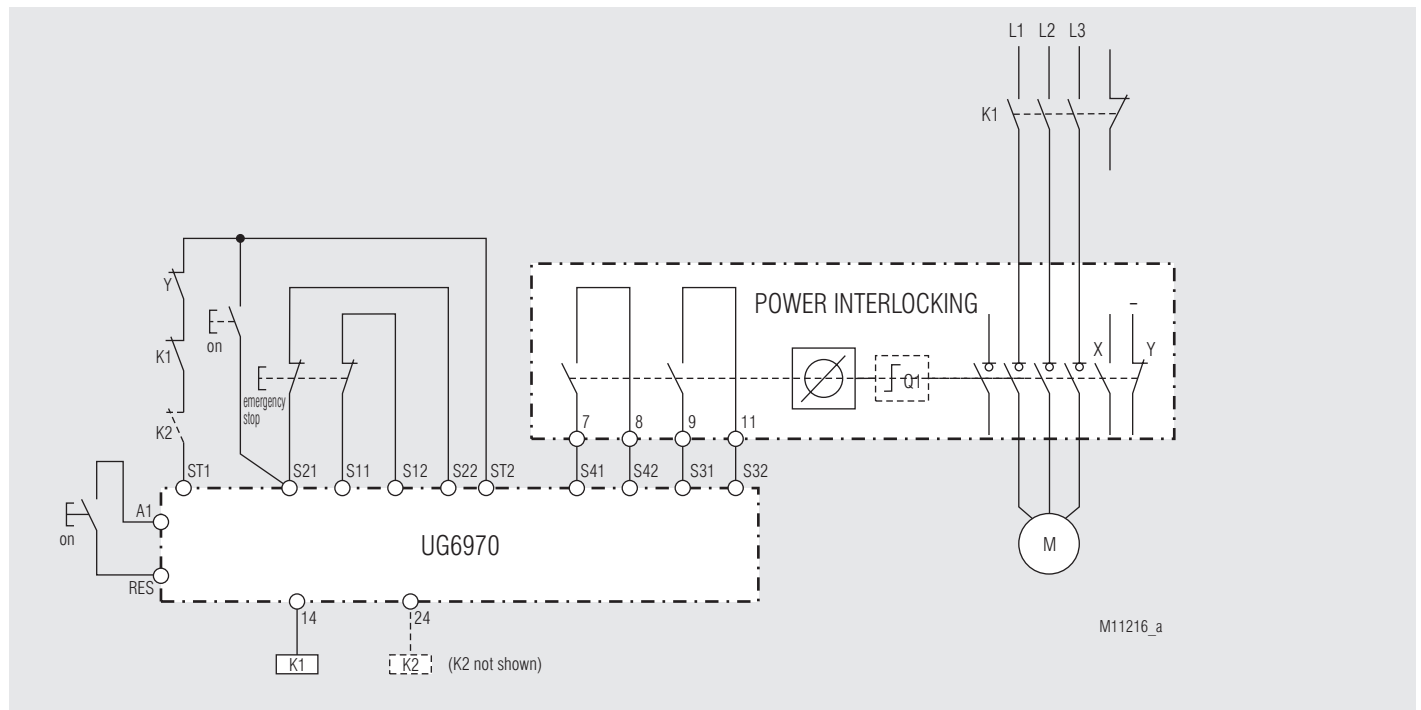
Power Interlocking units are part of a SAFEMASTER STS System. The final safety-related characteristic values must be evaluated as system according to the requirements of EN ISO 13849-1 and validated according to 13849-2.

Application examples (in zero voltage state)



Application example 1: Mechanical design

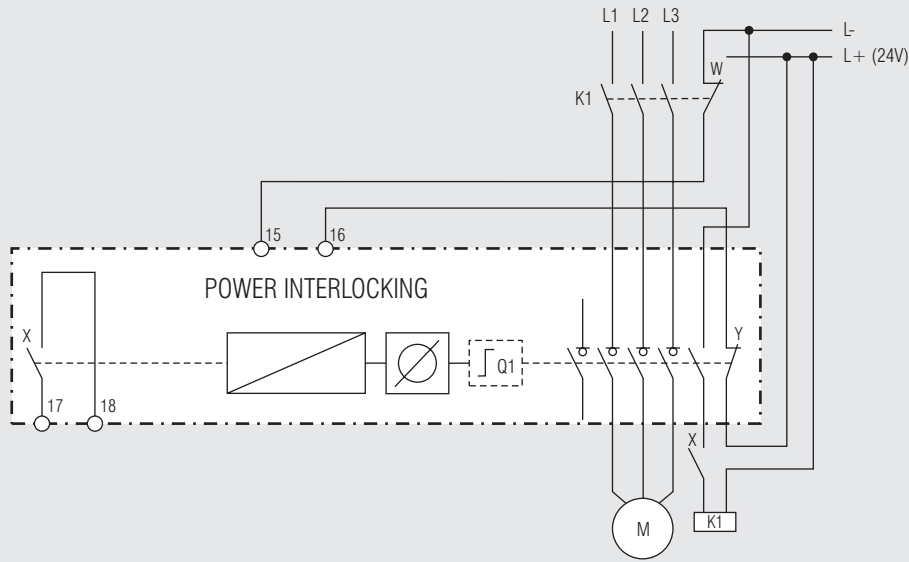
Power Interlocking without monitoring function and without redundancy (Stop 0).
After disconnecting the load isolator 1 to 5 keys can be removed.



Application example 2: Version with switch

Power Interlocking with monitoring function.

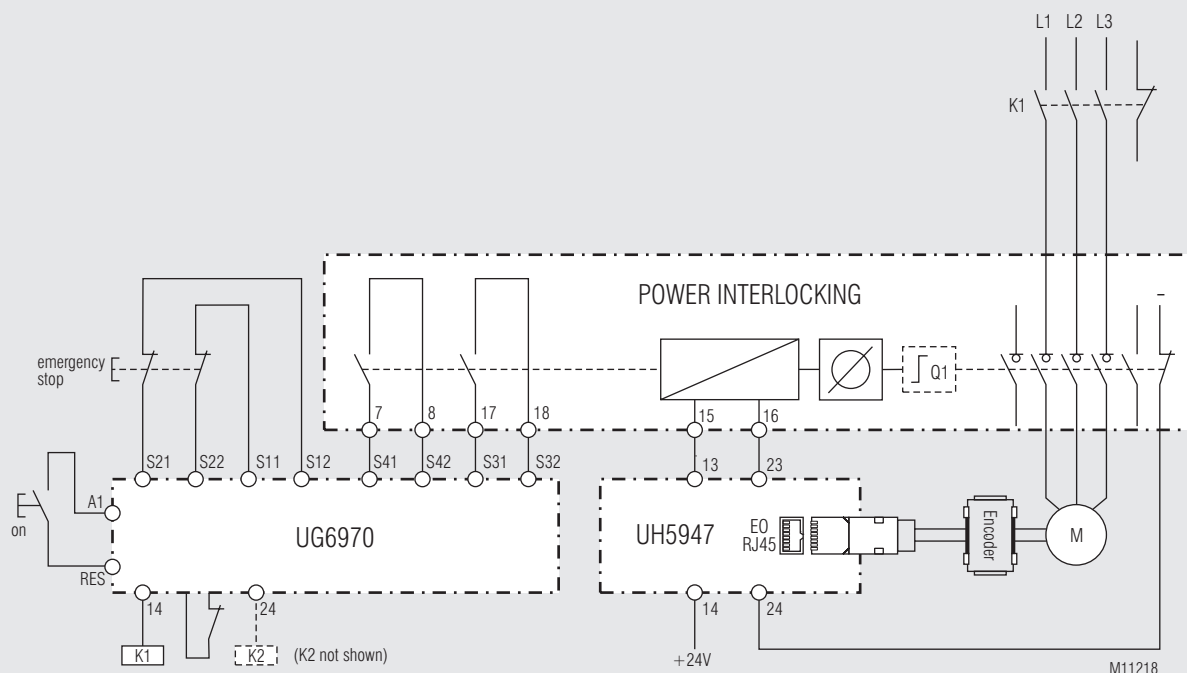
After disconnecting the load isolator 1 key can be removed immediately. This key is equipped, in addition, with monitoring contacts. If necessary, they can be included in a safety circuit together with an auxiliary contact of the load isolator.



M11147

Application example 3: Version with solenoid locking

Disconnected state, magnet energized (24 V), key inserted and removable.
 Power Interlocking where standstill monitoring, time delay or other monitoring functions can be added.
 The key can be removed only after disconnecting the load isolator and release by the magnet.



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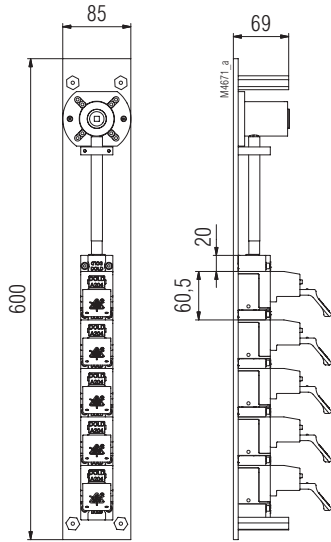
Application example 4: Version with solenoid locking

Disconnected state, magnet energized (24 V), key inserted and removable.
 Power Interlocking with monitoring function and mechanical redundancy;
 - Stop 0 over Q1;
 - Stop 1 over circuit logic and additional alarm function

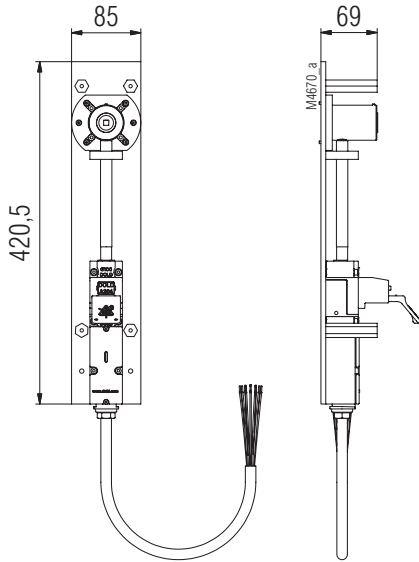
SAFEMASTER STS units

The drawings presented specify the maximum space required for the STS unit and base plate within the switching cabinet.

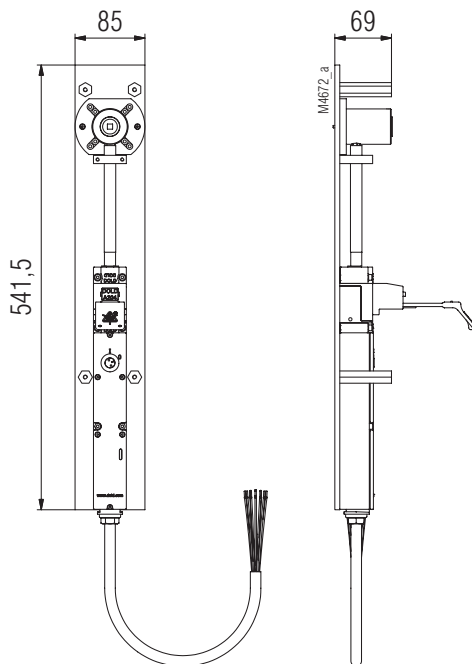
**Mechanical
M50SL1**



**Switch
SX01SL**



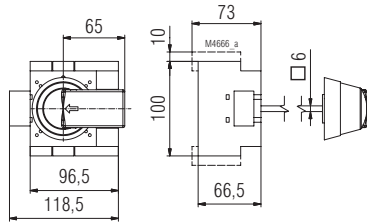
**Solenoid locking
ZRH01SL**



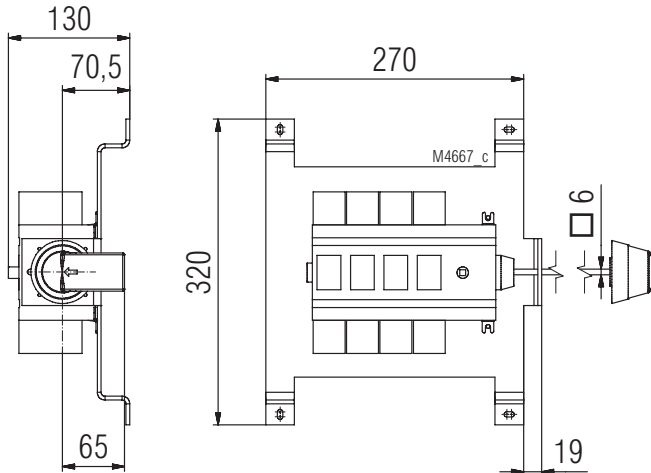
Load isolator

The drawings of the load isolator and, if applicable, mounting brackets, specify the maximum space required for the specified amperage range of the load isolators.

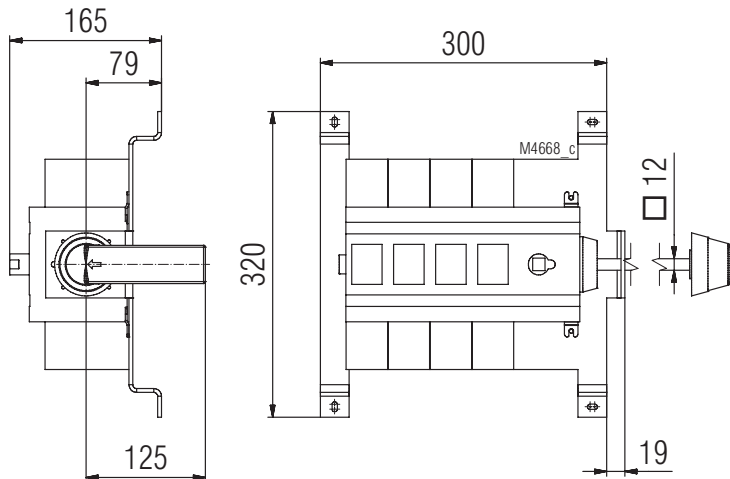
OT 25 - 125 A



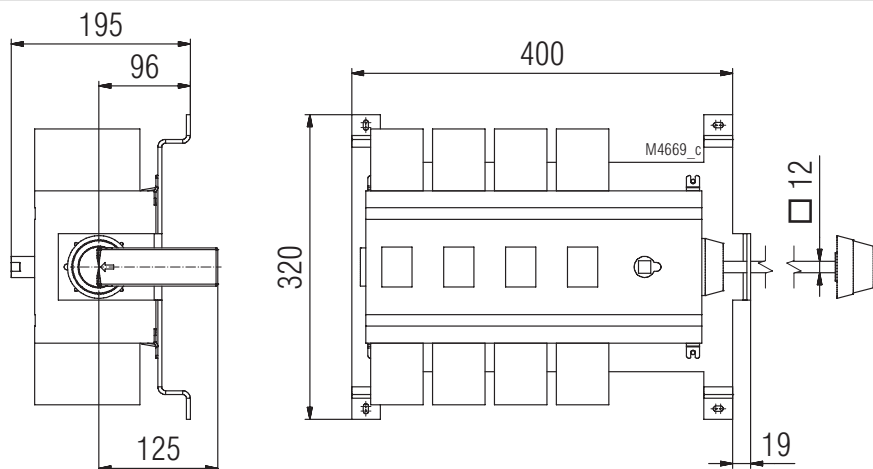
**OT 160 - 250 A
with mounting
bracket**



**OT 315 - 400 A
with mounting
bracket**



**OT 630 - 800 A
with mounting
bracket**



Note:

For dimensions for drill holes and cut-outs in the switching cabinet wall for mounting the STS Power Interlocking, refer to the SAFEMASTER STS mounting and operating instructions.

Assembly and installation example

Presentation: Load isolator disconnected and locked

Power Interlocking
M50SL1PR630

