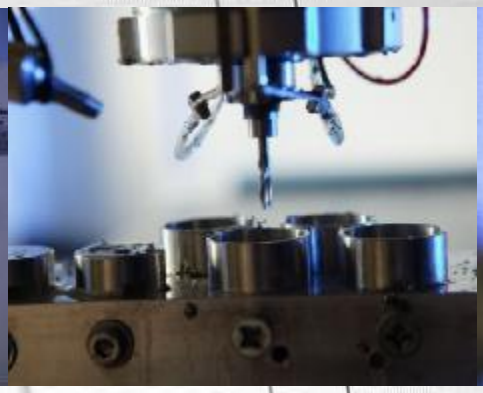

Door Interlocks

HST 03_08 EN

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Door interlocks

Safety of machinery

Hazardous machines and systems are frequently equipped with safety elements (safety doors) with a locking mechanism to protect the operator. Their function is:

a) to prevent hazardous machine functions if the safety door is not closed and locked,

b) to keep the safety door closed and locked until the risk of injury has passed.

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Advantages for the user

Interlock systems with locking devices of this nature include key-operated mechanical interlocks, also known as key transfer systems. They are based on the easily understood premiss that a key cannot be in two places at the same time. It can, for instance, be inserted in a switch OR be used for opening a door interlock.

Another important safety characteristic is that a key can only be withdrawn in a safe condition where no hazards exist (a switch is turned off, a door interlock is closed and locked).

The great advantage of the system is the fact that a particular sequence of measures can be implemented when designing the system. It is not possible to deviate from this sequence, so a high degree of safety is achieved.

This means that virtually any hazard can be eliminated.
The system consists of central electrical elements (e.g. in the control panel) and mechanical units on the safety doors. The devices are very often used in areas where electrical components are not suitable or expensive to install, due to space considerations, other environmental conditions or explosion hazards.

Devices can be supplied with individual codes (up to 5 engraved digits). This enables the achievement of a higher degree of safety and better protection against tampering.

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Advantages

Advantages of mechanical door interlocks:

- High degree of safety
- Stainless steal standard
- Dust-cap standard
- Only pre-determined secure safety sequences are possible
- No spare actuator “in the pocket”
- No cables to individual safety doors (cost savings, fault prevention)
- Easy retro-fitting
- Door interlocks have a locking feature
- particularly suited when there are different energy types on the machine (electric, pneumatic, ...)
- In areas where people can be trapped: personal safety key
- Simple option for realising safety conditions for setup
- Time delay due to key transfer between the switch and interlock
- running-down processes come to a standstill (extend with additional unit if necessary)

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Varied applications for personal safety

- Automotive industry
- Robots
- Machine tools
- Automation
- Packaging machines
- Food
- Textiles
- Breweries
- Building industry
- Chemical industry
- Pharmaceutical industry
- Plastics
- Oil / Gas
- Steel
- Mining
- Power generation / distribution
- Environmental protection
- Power stations

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Keys are coded so that they only fit the lock for which they are intended, thus ensuring a high degree of safety.

The user selects an engraving for the key that is of relevance to him or her (max. 5 digits). This appears on the key, the respective lock and its dust-cap.

The manufacturer assigns an internal code to the desired engraving, and this code data is stored to enable delivery of the correct devices in the event of subsequent orders at a later stage.

Features / Technical data:
Key is manufactured completely of stainless steel
Alphanumeric engraving of up to 5 different digits
High quantity of different codes

ORDERING CODE

HST-K1-xxxxx key with engraving xxxxx

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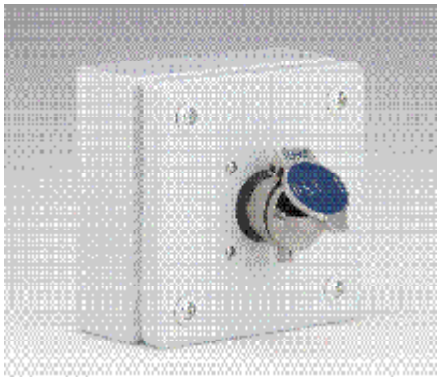
The **HST-S** switch is used for isolating the machine. After the voltage has been switched off, the previously trapped key can be withdrawn and used for the next step (e.g. opening a safety door).

The unit is available as a cast aluminium housing or panel-mounted version.

Versions with multiple locks are also available (sheet-steel housing version with up to 2 locks, up to 5 for the panel-mounted version).
Moreover, versions in explosion-proof housings conforming to ATEX are also available (zones 21 and 22 and 1 and 2, documents available on request).

It is important to give consideration to the running-down duration of the drive when utilising this switch type to ensure that the hazard zone can only be reached when the drive is stationary.

HST-SU1
Panel, one lock



HST-SA1
Housing, one lock

HST-SU2
Panel, two locks

Features / Technical data:

Standard reference:	DIN EN 60947-1
Ambient temperature:	0 - 55°C
Mech. service life:	1 million actuations
Switch approval:	UL, CSA, equivalent to requirements of VDE 0660 Part 107
Material of lock / actuator:	stainless steel
Degree of protection:	housing version: IP 54
Degree of protection:	panel version: IP 2X
Rated continuous current (Iu/Ith):	20A
Rated operating current (AC-15)	5A (240V)
Rated insulation voltage (Ui): (wich can vary in different approbations)	690 V
Rated impulse withstand voltage resistance level (Uimp):	6kV
Short-circuit resistance (Si.):	max. 25 A (gl)
Connection cable cross section:	2 x 0.5 - 2 x 2.5 mm^2

Please note: This switch is a control switch, NOT a load-break switch.Version with a load-break switch on request.

Ordering code

HST-S__ __ - __ __

- Contact versions:
  11 = 1Ö+1S 20 = 2Ö 22 = 2Ö + 2S 40 = 4Ö
- Number of locks:
  (housing version up to 2, panel version up to 5)
- Version:
  U = panel version A = housing version

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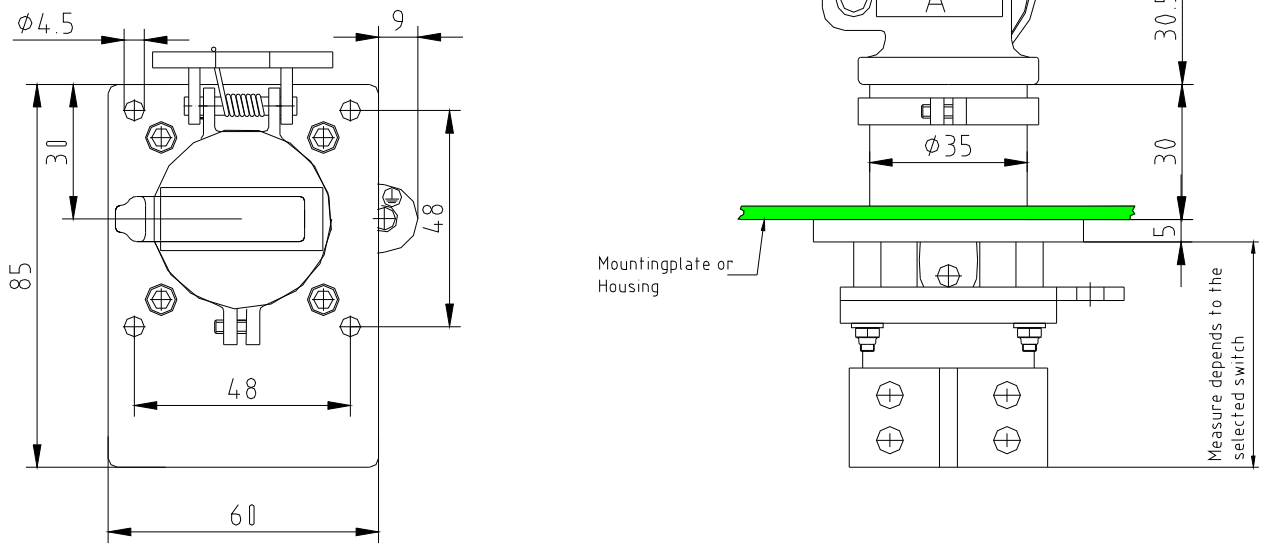
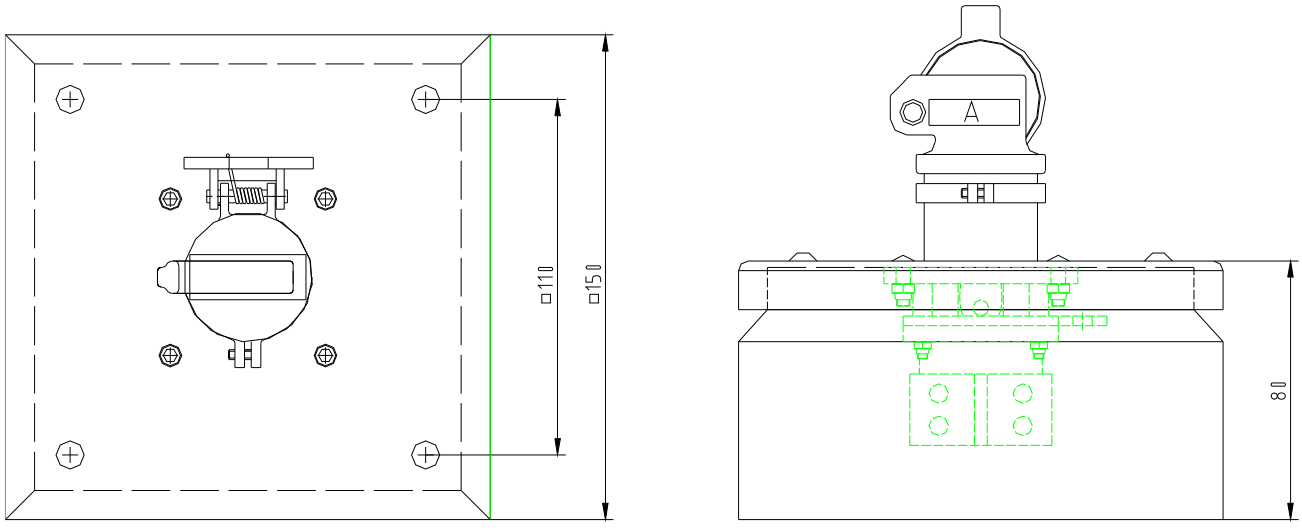
Dimensions:

HST-SU1



HST-SA1



Through holes for mounting:ø8.7 mm

Dimensions of other versions available on request

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For certain applications (e.g. machines with running-down duration, access to a safety door controlled by the PLC), it is important that it should not be possible to withdraw the key each time from a key switch. In the case of this series of electrical rotary switches fitted with a solenoid, the key can only be turned and removed when external power is applied (e.g. from a standstill monitor or a timer). A rotary switch with a selectable contact configuration (see below) and a microswitch with positively-opened contacts are actuated by turning and withdrawing the key. The magnet is characterised by 100% ON duration. However, the voltage is applied to the solenoid via a pushbutton in order to avoid continuous heating. The unit is available as a panel version (HST-MU) and in a metal housing (HST-MA). Versions with multiple locks are also available (up to 4 locks for panel and housing version).
A version in an explosion-proof housing conforming to ATEX is also available (zones 21 and 22 and 1 and 2, documents available on request).

HST-MU1
Panel, one lock

Features / Technical data:

Standard reference:	DIN EN 60947-1, DIN EN 1088
Ambient temperature:	0 - 55°C
Mech. service life:	1 million actuations
Switch approval:	UL, CSA, equivalent to requirements of VDE 0660 Part 107
Material for lock / actuator:	Stainless steel
Degree of protection:	housing version:..IP 54
Degree of protection:	panel version: IP 2X

HST-MA1
Housing, one lock

Switch data:

Rated continuous current (Iu/Ith):	20A
Rated operating current (AC-15):	5A (240V)
Rated insulation voltage (Ui):	690 V
(wich can vary in different approbations)	
Rated impulse withstand voltage resistance level (Uimp):	6kV
Short-circuit resistance (Si.):	max. 25 A (gl)
Connection cable cross section:	switch: 2 x 0.5 - 2 x 2.5 mm²
	Terminal block: 0.2 – 2.5 mm²

Solenoid data:

Operating voltage:	DC: 24V / 110V AC: 110V / 230V
Coil value:	attraction: 35 W, retention: 8 W
ON duration:	100 %

HST-MU-3
Panel, three locks

Ordering code

HST-M__ __-__ -__

- Solenoid voltage: 24D = 24VDC, 110A = 110VAC, 230A = 230VAC
- Contact versions: 11 = 1Ö+1S, 20 = 2Ö, 22 = 2Ö + 2S, 40 = 4Ö
- Number of locks: (housing version up to 4, panel version up to 4)
- Version: U = panel version, A = housing version

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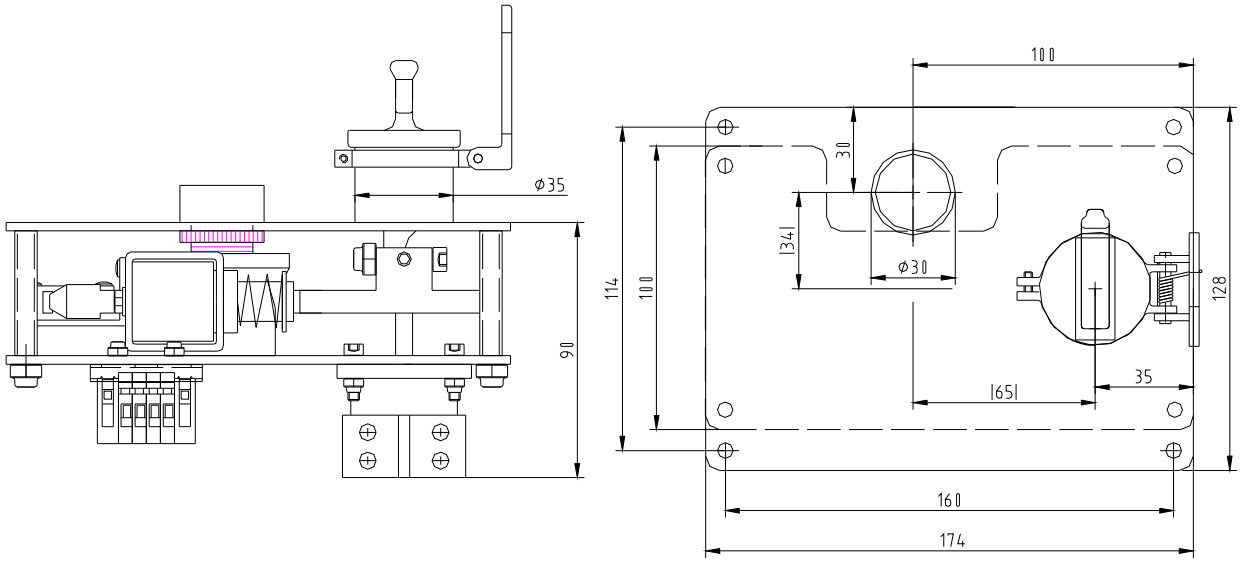
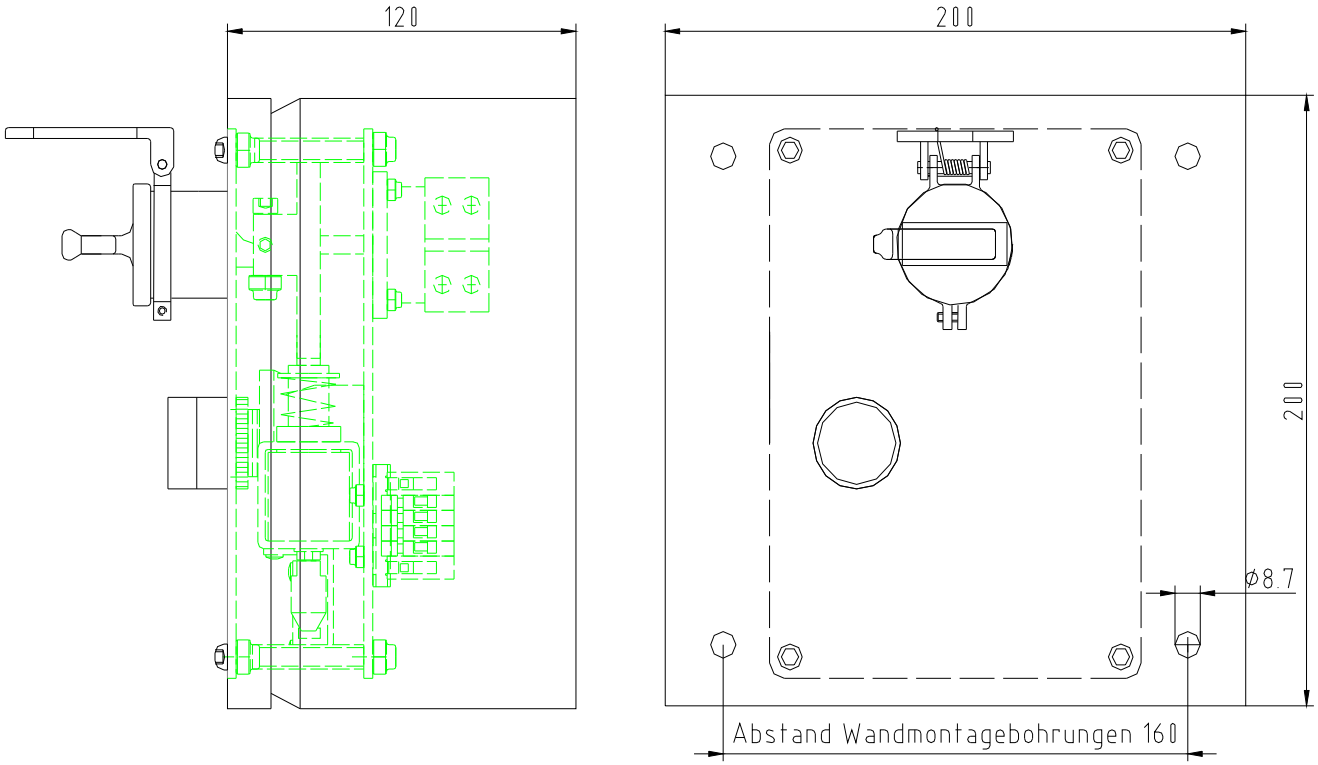
Dimensions:

HST-MU-1



HST-MA-1



Dimensions of other versions available on request

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The usual application of a bolt interlock is to lock electrical switchgear (circuit breakers, disconnectors and earthing devices). The bolt is extended into a corresponding recess in the handle or control element of the switching device and blocks it.

It should be noted that this unit is not intended for use without further measures for locking safety doors. Care has to be taken to ensure that the bolt cannot be extended and the key cannot be removed when the safety door is open.

Standard unit operation is as follows: insert and turn the key - the bolt is extended - the key is trapped, or the bolt is retracted - the key is trapped. The bolt travel is 18mm from the bolt home position (0, 6, 26 mm).

Several bolt interlocks can also be arranged in series for certain applications

Mounting: M8 tapped blind holes (from behind). Versions with through-holes instead of blind holes are also available.

HST-B1-R

Features / Technical data:

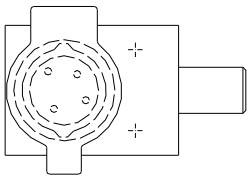
Positive bolt movement, practically maintenance-free
4 installation versions available
Optionally available with limit switch

Standard reference:	DIN EN 12100; DIN EN 1088;
Ambient temperature:	-25°C ... +80 °C (as a result of dust cap seal, higher temperatures on request)
Material:	stainless steel
Mounting:	2 x M8
Mech. service life:	1 million actuations

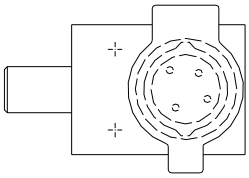
Limit switch technical data:

Contacts:	snap action 1Ö+1S
N/C contact:	positive break
Ambient temperature:	-25°C ... +80 °C
Conforms to norms:	IEC 947-5-1, UL 508, CSA 22-2 no.14

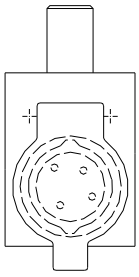
HST-B1S-R
with limit switch



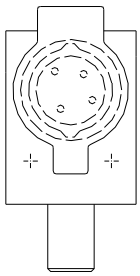
HST-B1-R



HST-B1-L



HST-B1-O



HST-B1-U

Ordering code

HST-B___ ___-

- Number of locks: 1 x
- Version: Use “S“ for version with limit switch
- Bolt alignment: R = right L = left O = top U = bottom
- Length of bolt when retracted (see table)

retracted	0mm	6mm	26mm
extended	18mm	24mm	44mm

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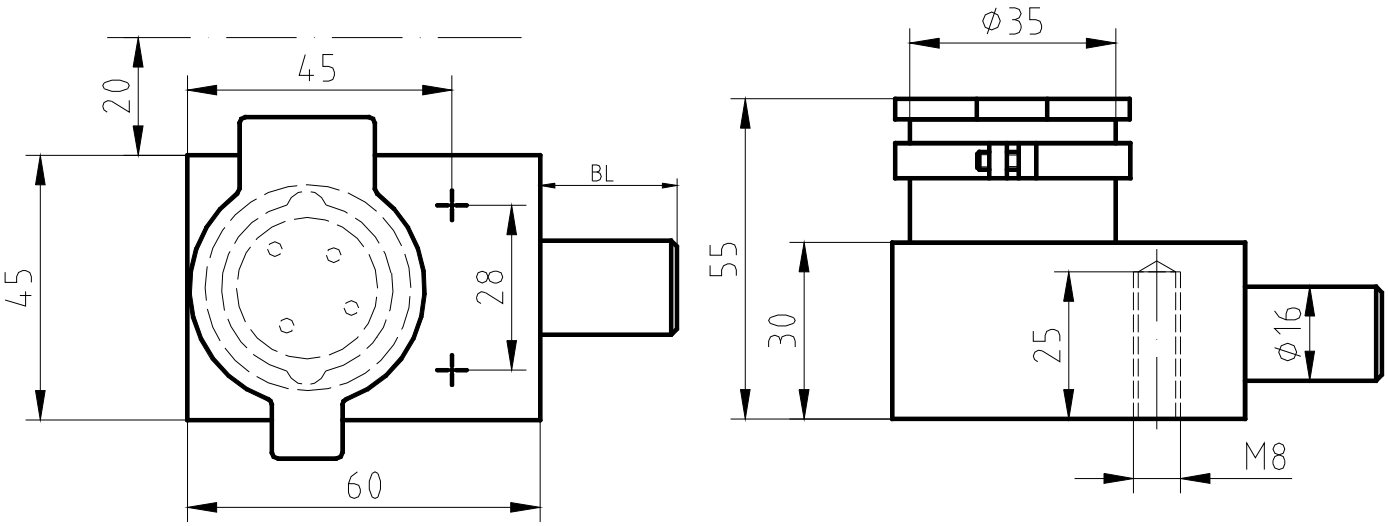
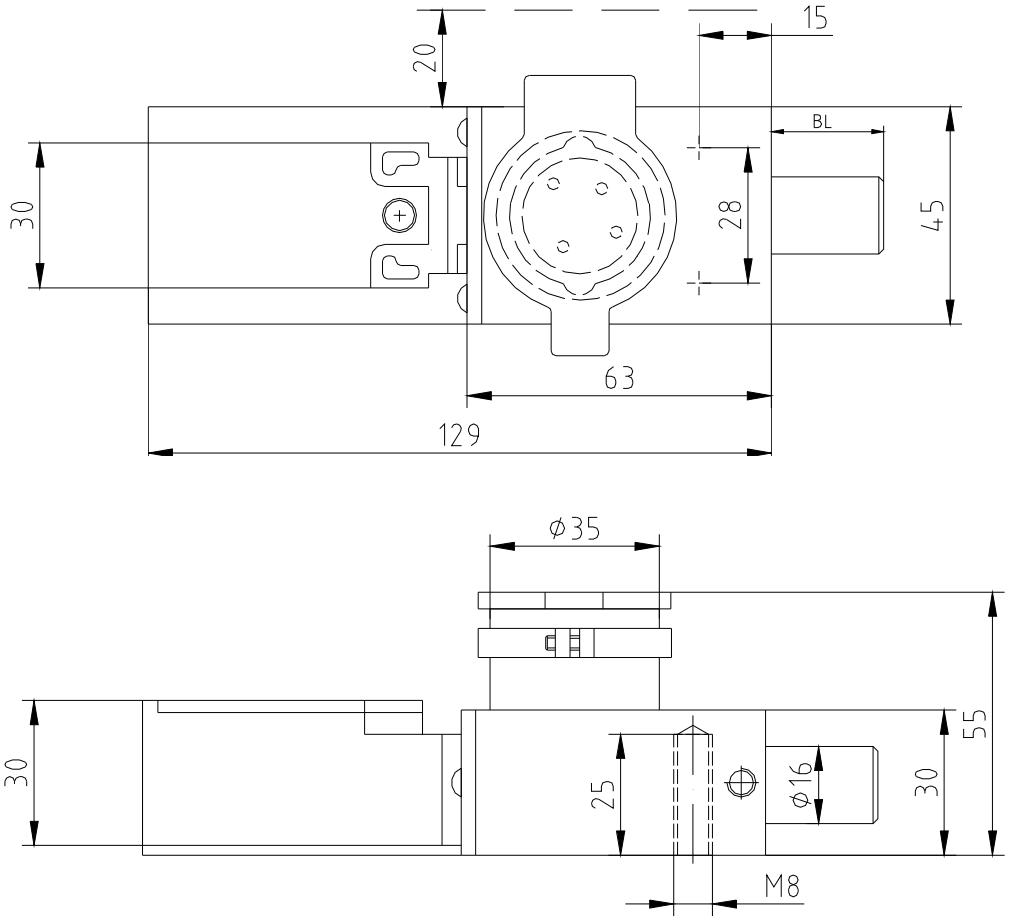
Dimensions:

HST-B1-R



HST-B1S-R



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This door interlock comprises a lock element and locking bolt element and can be used on sliding and hinged doors. The unit is made of stainless steel, making it suitable for use in rough environments where it is subject to high stress.

The flexible locking bolt design means the door interlock can also be used without any problems on misaligned and sagging doors.
Versions with the locking bolt positioned on the left (L), right (R), top (O) and bottom (U) are available (a total of 4 mounting positions).

The key is inserted and turned to open the safety door. The locking bolt can then be turned through 90° and withdrawn. The key is trapped. Locking the safety door is realised in reverse fashion, with the locking bolt being inserted and rotated. The key is then free and can be removed.

Mounting: M8 tapped blind holes (from behind), M6 locking bolt.

A version with an additional personal safety key (HST-TS2)can also be supplied for applications involving a full body access area. The operator takes the key with him into the hazardous area. The door therefore cannot be locked as long as a person is still in the hazardous area.

HST-TS1-R

HST-TS1K-R

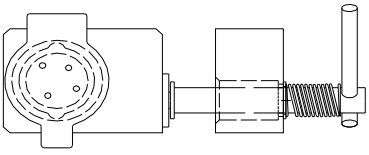
HST-TS2-R

Features / Technical data:

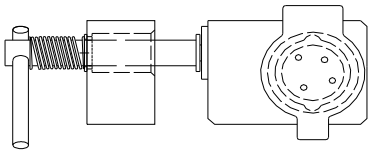
Sturdy design for use in rough conditions
Practically maintenance-free
4 installation versions available

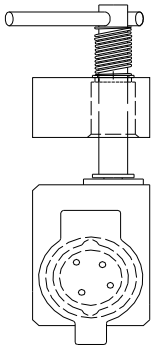
Standard reference:	DIN EN 12100; DIN EN 1088;
Ambient temperature:	-25°C ... +80 °C (as a result of dust cap seal, higher temperatures on request)
Material:	stainless steel
Mounting:	2 x M8 und 2 x M6
Locking force:	5000N (axial)
Mech. service life:	1 million actuations

HST-TS1-R

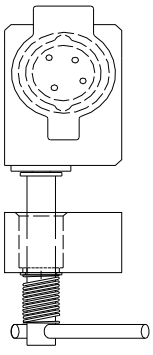


HST-TS1-L





HST-TS1-O



HST-TS1-U

Ordering code

HST-TS -

Bolt alignment R = right L = left O = top U = bottom

"K" for version with chain (200 mm)

Number of locks: 1 or 2 for version with personal key

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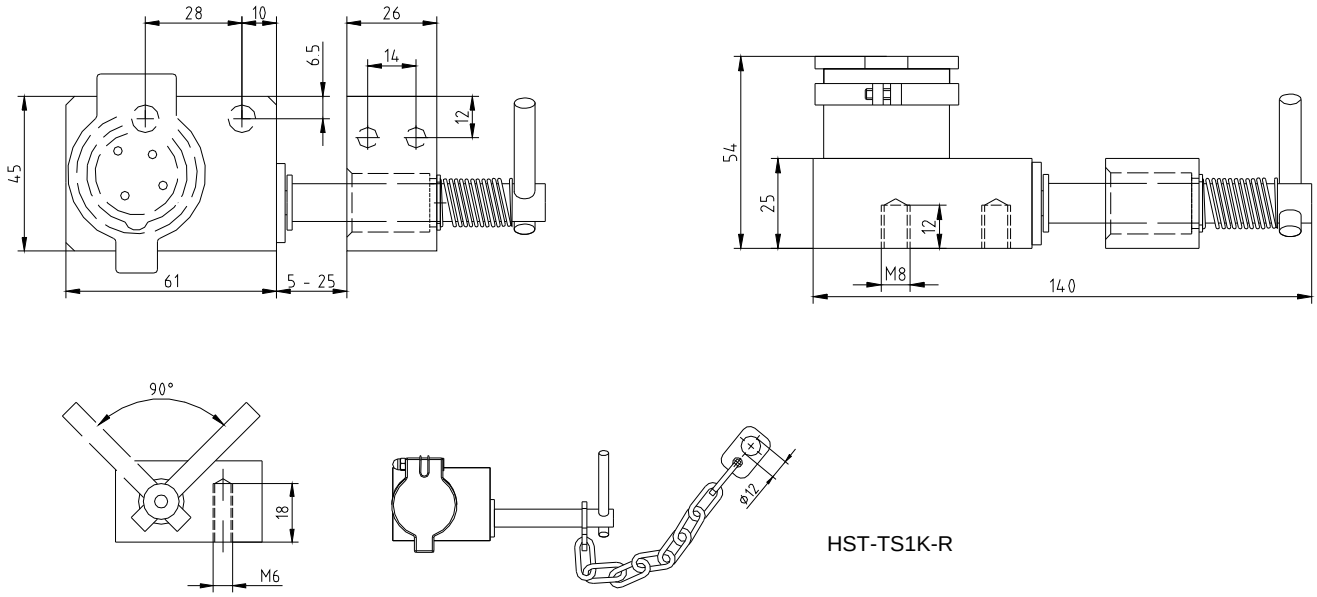
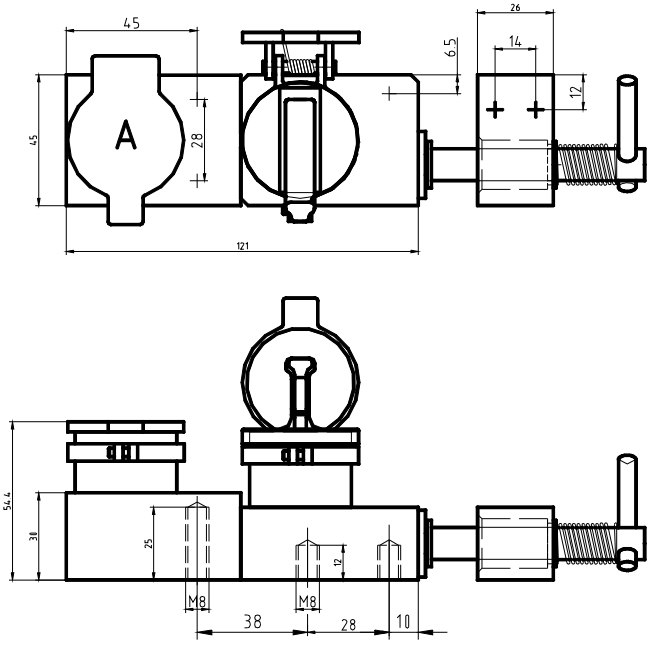
Dimensions:

HST-TS1-R



HST-TS1K-R

HST-TS2-R



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This door interlock comprises a lock element and locking bolt element and is distinguished by a flexible slam-type mechanism, enabling its use without any problems on misaligned and sagging doors. The unit is made completely of non-corrosive steel and can therefore also be used in rough conditions. Versions with the locking bolt positioned on the left (L), right (R), top (O) and bottom (U) and bolt entry at the front (V) or rear (H) are available (a total of 8 mounting positions).

The key is inserted and turned to open the safety door. The locking bolt is then pushed out of the lock body. Locking the door is realised in reverse fashion, with the locking bolt being inserted by pushing the safety door closed and turning the key. The key is then free and can be removed. Mounting: M8 tapped blind holes (from behind), M6 locking bolt.

A version with an additional personal safety key (HST-TZ2) can also be supplied for applications involving a full body access area. The operator takes the key with him into the hazardous area. The door therefore cannot be locked as long as a person is still in the hazardous area.

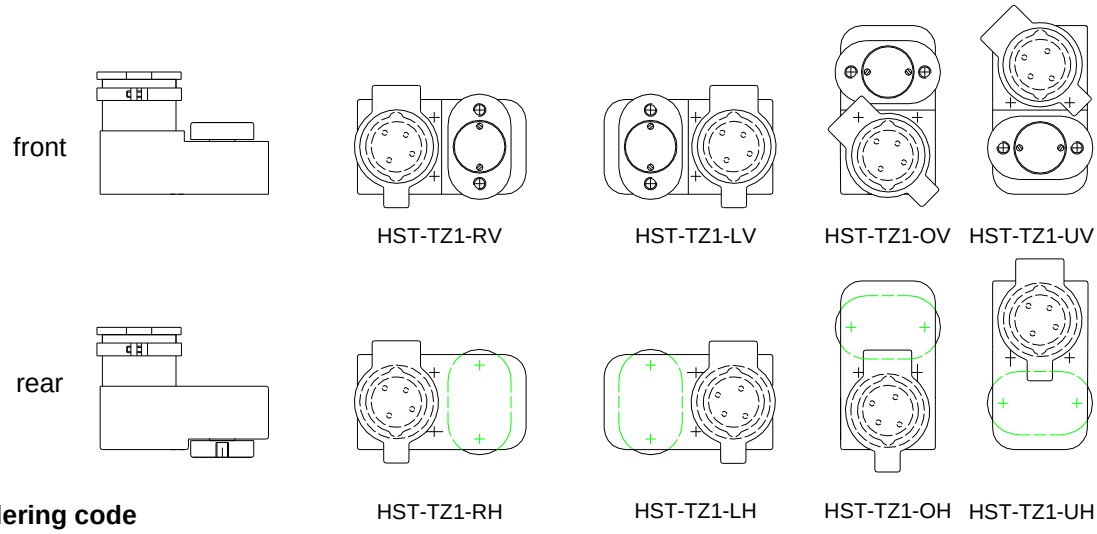
HST-TZ1-RV

HST-TZ2-RV

Features / Technical data:

Sturdy design for use in rough conditions, practically maintenance-free
8 installation versions available

Standard reference:	DIN EN 12100; DIN EN 1088;
Ambient temperature:	-25°C ... +80 °C (as a result of dust cap seal, higher temperatures on request)
Material:	stainless steel
Locking force:	5000 N
Mounting:	2 x M8 und 2 x M6 (internal thread at rear)
Mech. service life:	1 million actuations



Ordering code

HST-TZ

- Bolt alignment V = front H = rear
- Bolt alignment R = right L = left O = top U = bottom
- Number of locks: 1 or 2 for version with personal key

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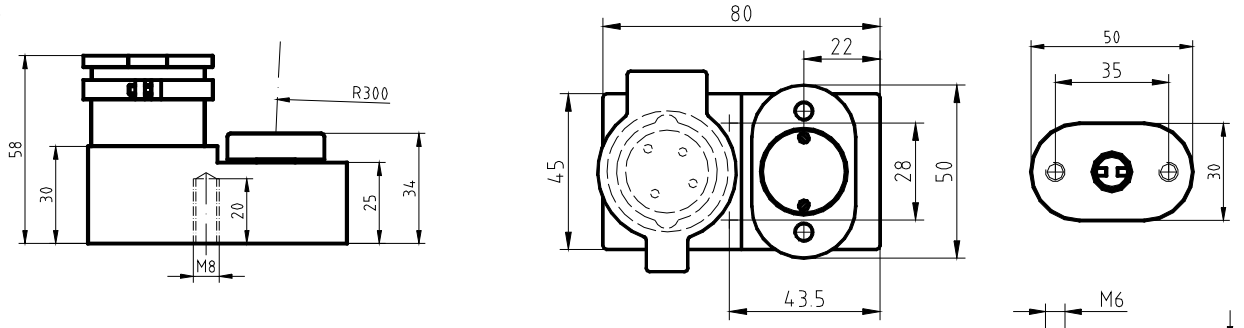
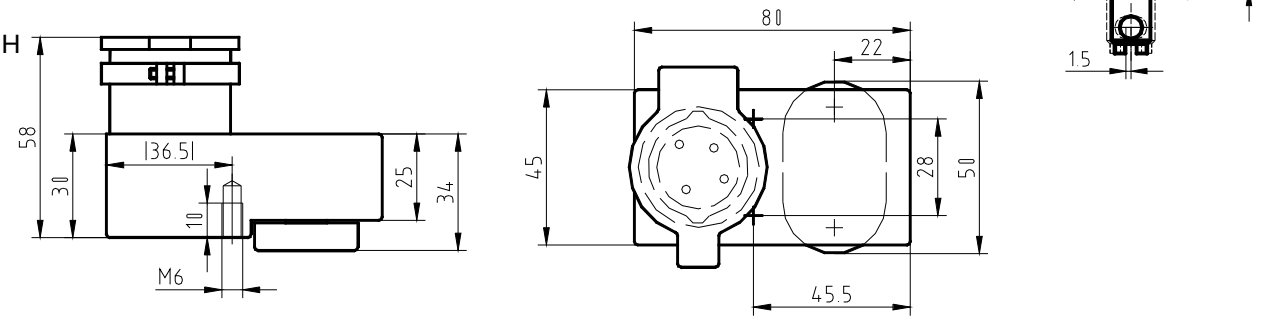
Dimensions:

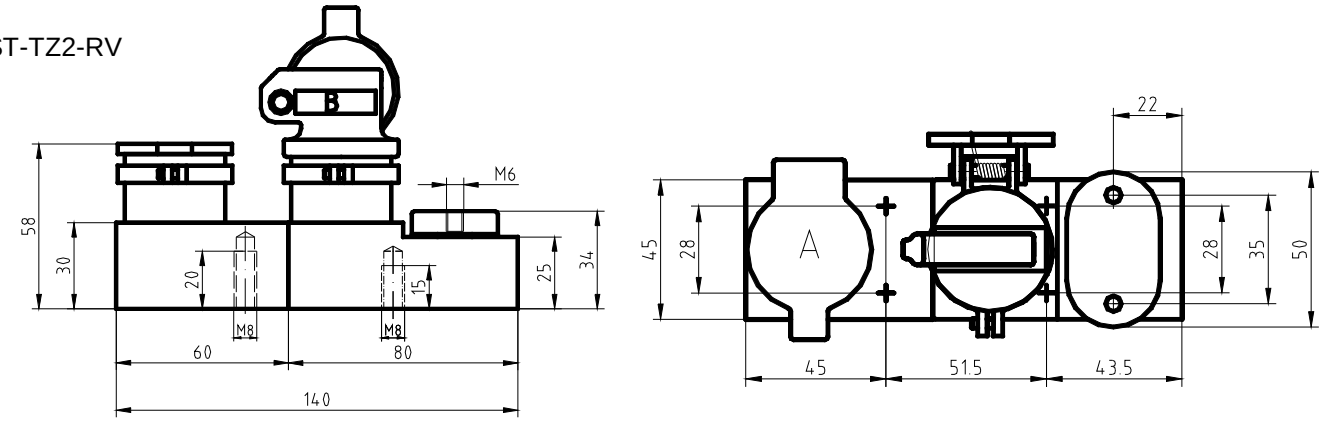
HST-TZ1-RV



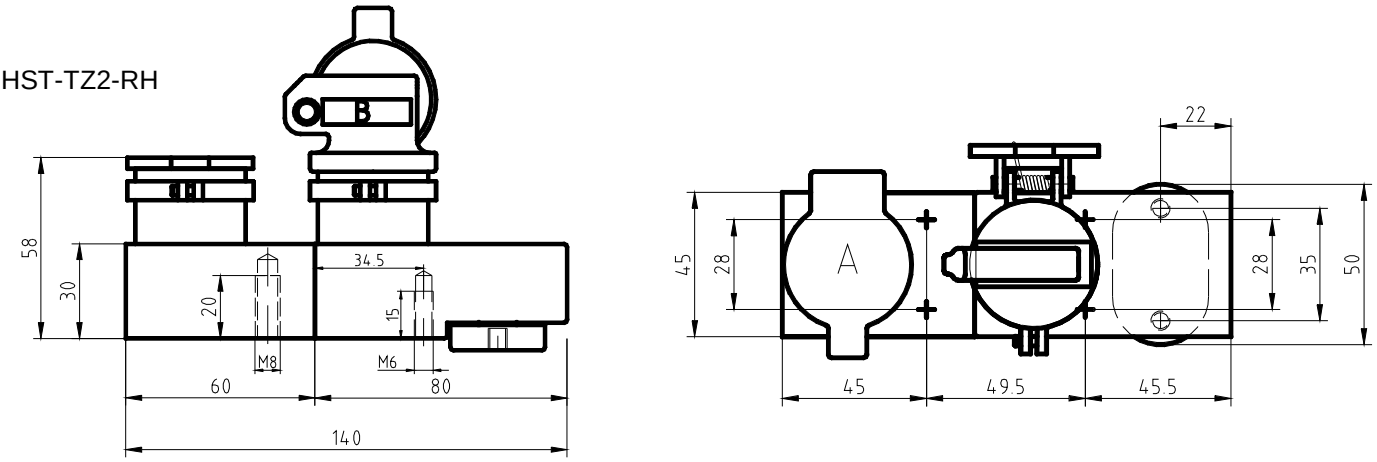
HST-TZ1-RH



HST-TZ2-RV



HST-TZ2-RH



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Key exchange units are normally used to multiply the number of keys or for linking certain sequences of a safety system. One or more primary keys are inserted in order to free a desired number of secondary keys.

A key exchange unit is usually used as an interface (e.g. between a switch and the safety doors).

The advantage of this system is the modular design. This means that additional lock elements can be added later (e.g. when another safety door needs to be secured).

A key exchange unit consists of bolt interlocks and comprises x primary modules and y secondary modules. The number of units is limited to 4 modules. For applications in wich several keys have to be exchanged the exchange unit HST-W is on offer.

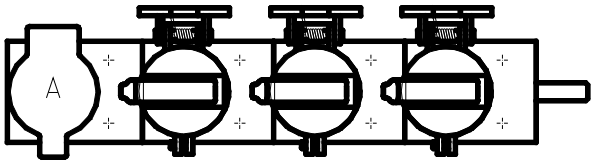
Mounting: M8 tapped blind holes (from behind). Versions with through-holes instead of blind holes are also available.

1 x HST-X-E-H
3 x HST-X-A-H

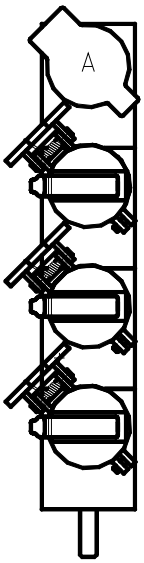
Features / Technical data:

Sturdy design for use in rough conditions
Practically maintenance-free
Keys are actuated successively
2 installation versions available (horizontal and vertical)

Standard reference:	DIN EN 12100; DIN EN 1088;
Ambient temperature:	-25°C ... +80 °C (as a result of dust cap seal, higher temperatures on request)
Material:	stainless steel
Mounting:	2 x M8
Mech. service life:	1 million actuations



1 x HST-X-E-H
3 x HST-X-A-H



1 x HST-X-E-V
3 x HST-X-A-V

Ordering code **(NOTE: always specify the number of primary and secondary locks in the case of exchange units - see example, max. 4 modules total)**

HST-X -__ -__

Desired mounting position H = horizontal V = vertical

Primary or secondary lock E = primary A = secondary

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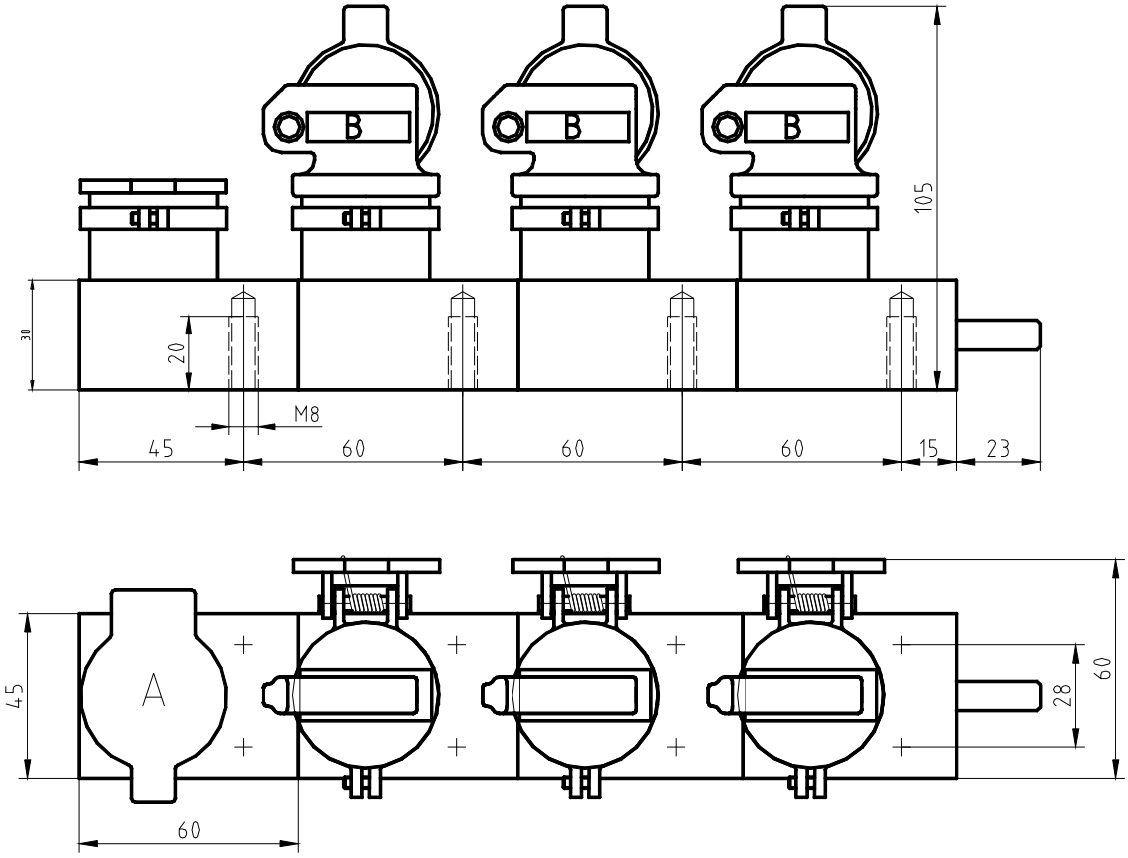
Dimensions:

1 x HST-X-E-H
3 x HST-X-A-H



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In addition to the modular key exchange unit, an exchange unit is frequently used which releases the other keys via a cam disk system. This system is used in applications involving a large number of doors or valves (e.g. precipitators).

The objective is the same as for the HST-X exchange unit, namely multiplication of keys or linkage of certain sequences of a safety system. One or more primary keys are inserted in order to free a desired number of secondary keys.

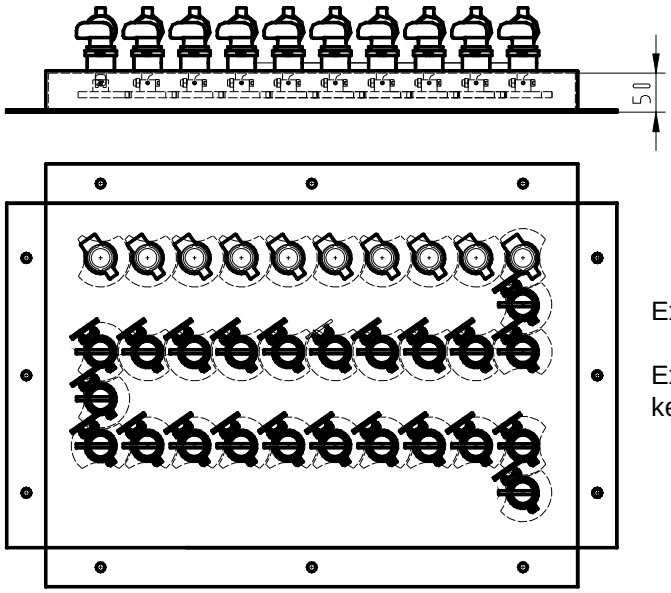
This type of exchange unit can be supplied as an integration unit (e.g. for installation in an existing switch cabinet) and a mounted version in a housing.
Different sizes are available here, depending on the number of keys needed.

Please specify your application and the number of primary and secondary locks required.

Features / Technical data:

Sturdy design for use in rough conditions
Practically maintenance-free
Keys are actuated successively
2 installation versions availalbe (mounted and integrated version)

Standard reference:	DIN EN 12100; DIN EN 1088;
Dimensions:	on request
Ambient temperature:	-25°C ... +80 °C (as a result of the dust cap seal, higher temperatures on request)
Mech. service life:	1 million actuations



Example: HST-WA-10/23

Exchange unit in housing with 10 primary keys and 23 secondary keys

Ordering code **(NOTE: always specify the number of primary and secondary locks in the case of exchange units - see example)**

HST-W __ - __ / __

- Number of desired primary keys
- Number of desired secondary keys
- Integrated or mounted version U = integrated A = mounted version

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The common usage of this locking system is to secure electrical switchgears/control units. The switchgear is oprerated via the square shaft (□ 9.5 mm). The key can only be removed from the lock in a secure position.

This module can also be employed to operate locking levers or other equivalent connection modules.

The module is built out of stainless steel, making it suitable for heavy usage in rough environments.

The assembly is carried out via the already fitted mounting plate with M6 security screws and self-locking nuts.

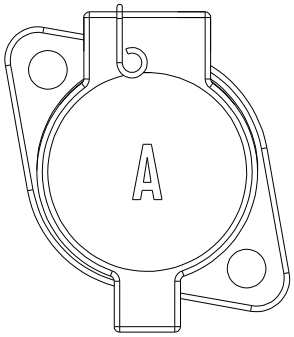
The module is available for both left or right-hand alignment.

HST-LS

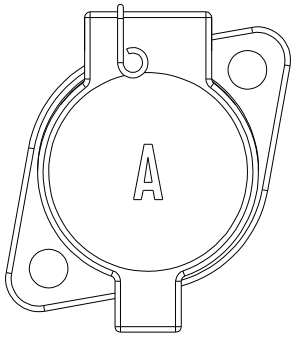
Features / Technical data:
Sturdy construction for usage in rough environments,
practically maintenance-free
2 mounting variations available

Ambient temperature:	-25°C ... +80 °C (depending on dust cap insulation, higher temperatures on request)
Material:	stainless steel
Mounting:	2 x M6
Mech. service life:	1 million actuations

HST-LS



HST-LS-L



HST-LS-R

Ordering key

HST-LS-

Alignment of mounting plate:
L = left R = right

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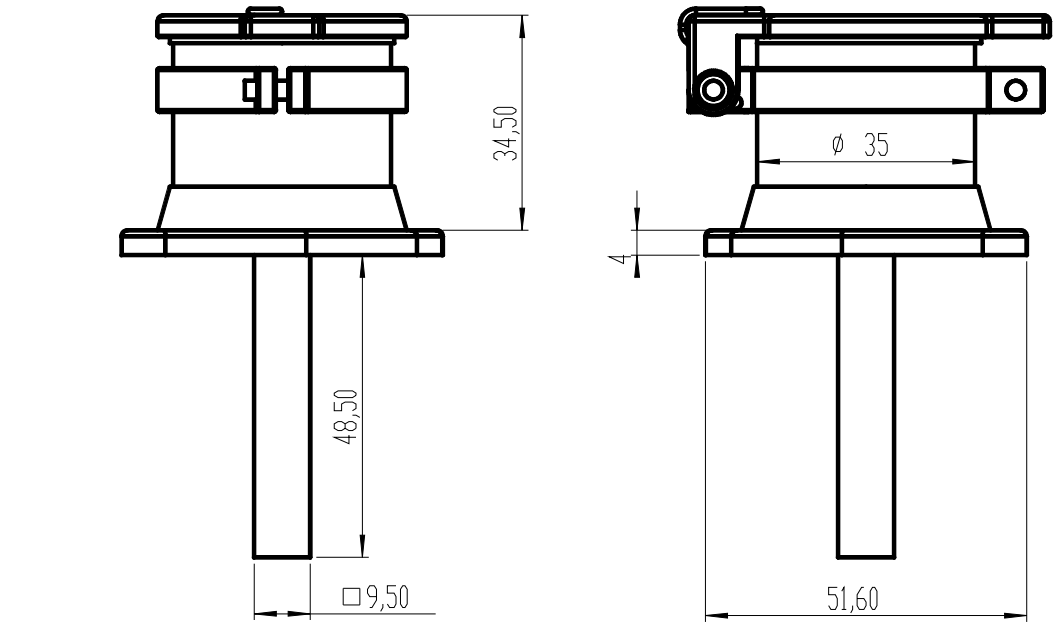
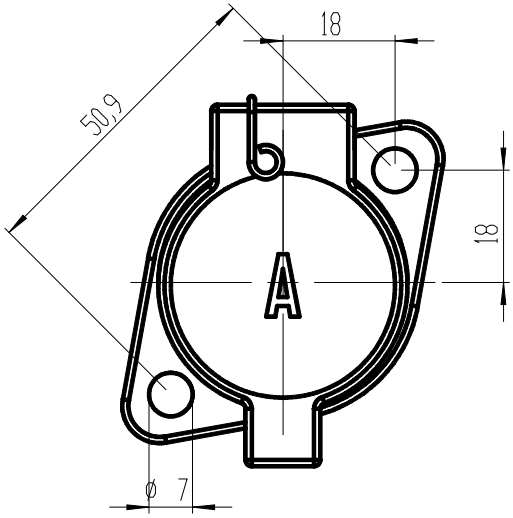
Measurements:





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The module **HST-XC** can be employed as endpiece for the exchange unit. While using HST-XC the bolt of the last module of the exchange unit is covered up.

The module is built out of stainless steel and is suitable for heavy usage in rough environments.

The assembly is equivalent to HST-X with 2 x M8 inner threads.

HST-XC

Features / Technical data:
Sturdy construction for use in rough environments,
practically maintenance-free

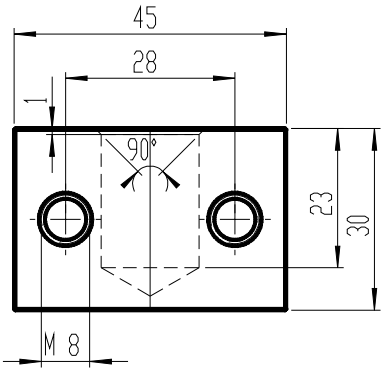
Ambient temperature:	-25°C ... +80 °C (higher if HST-X is built accordingly)
Material:	stainless steel
Mounting:	2 x M8

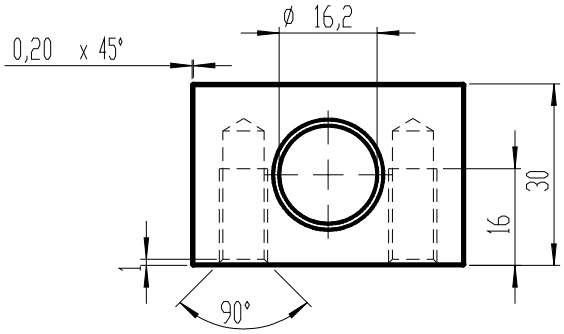
HST-XC

Ordering code

HST-XC

Measurements:





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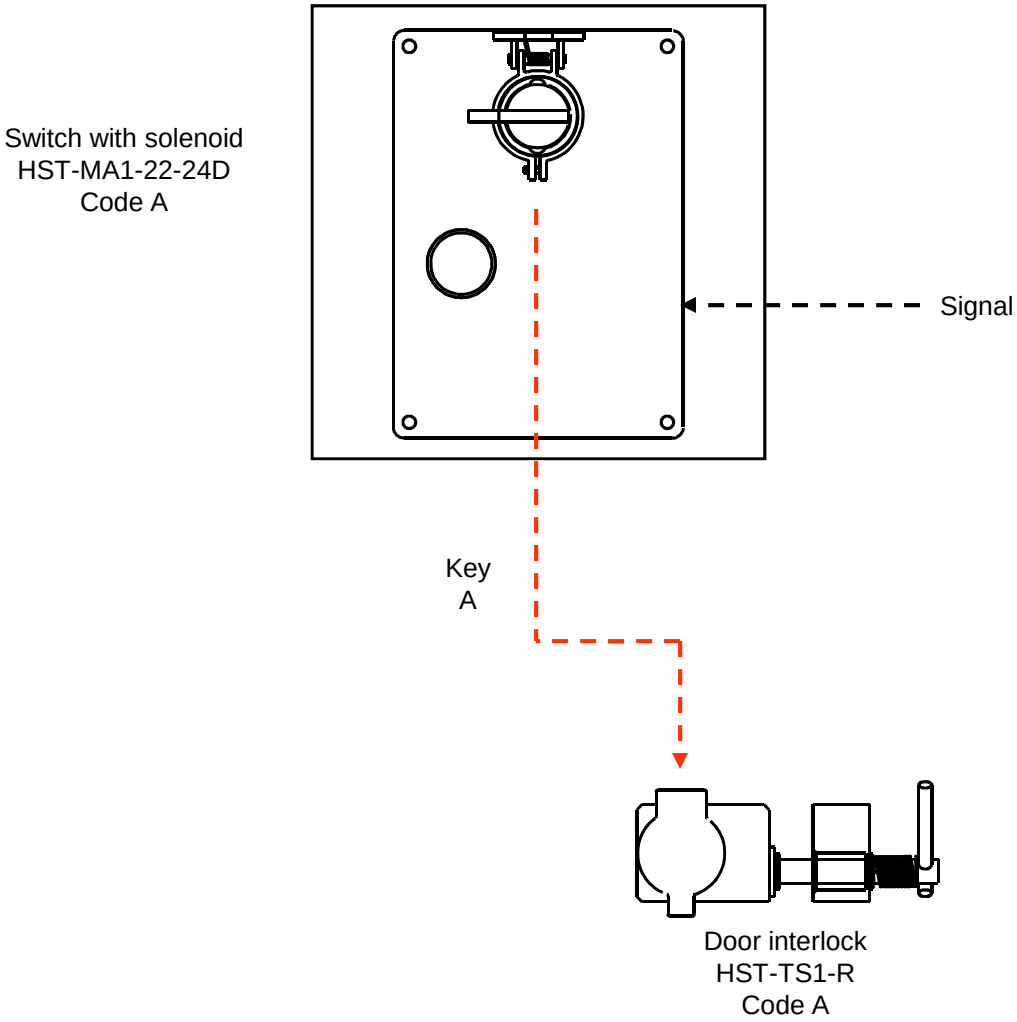
This example shows the shutting down of a machine with running-down time and a single safety door (part-body access). The rotary switch with solenoid HST-M... is used for this purpose. The machine control system generates a signal which is applied to the rotary switch solenoid after the machine has shut down and is stationary. Key A can now be turned, removed and used for opening the door interlock HST-TS... .



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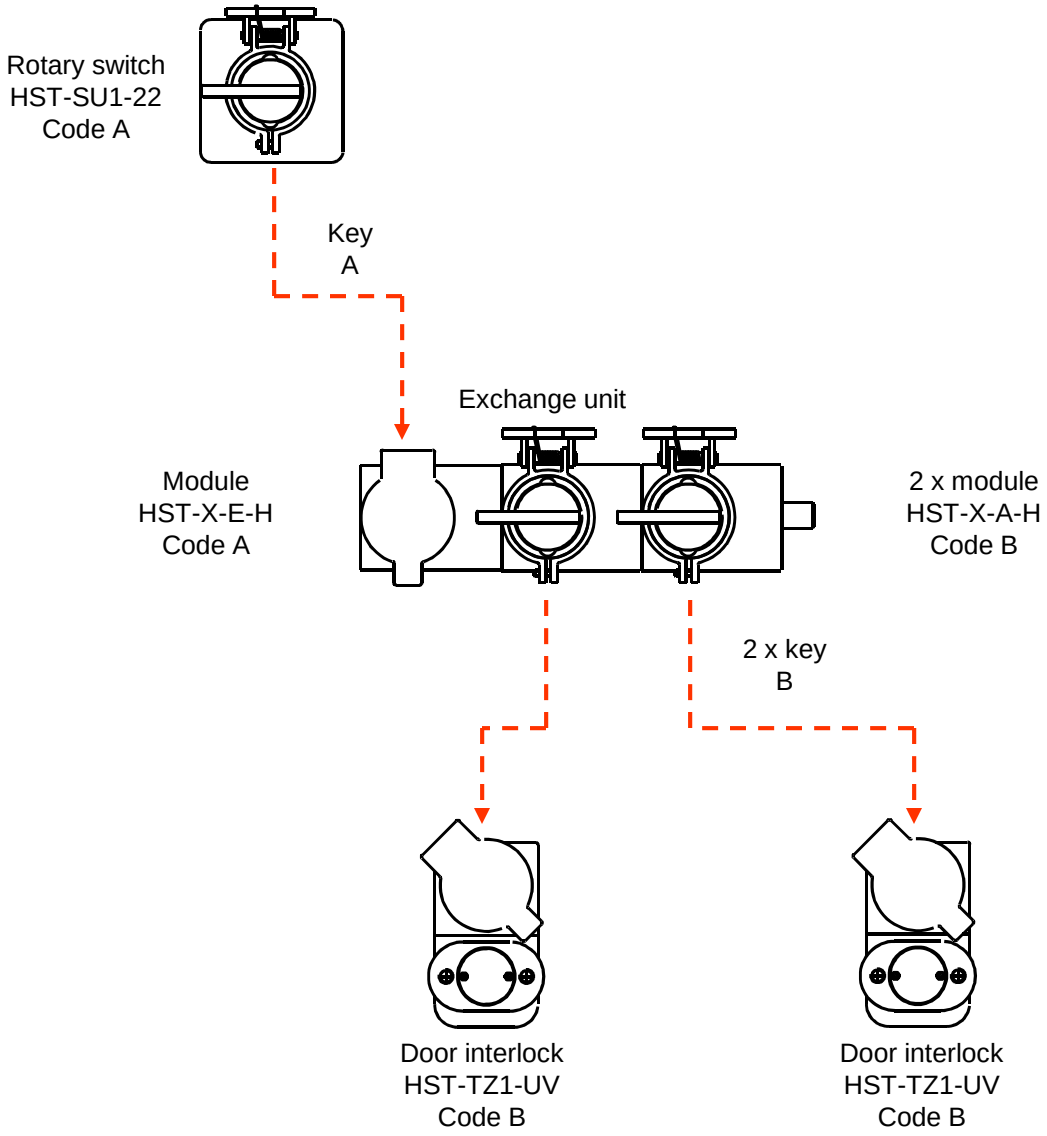
This example shows the shutting down of a machine without running-down time and two safety doors (part-body access). The rotary switch HST-SU... is used for this purpose. After switching-off, key A can be removed from the rotary switch and be used for releasing the two B keys in the key exchange unit HST-X.... The two door interlocks HST-TZ... of the safety doors can be opened with the B keys.



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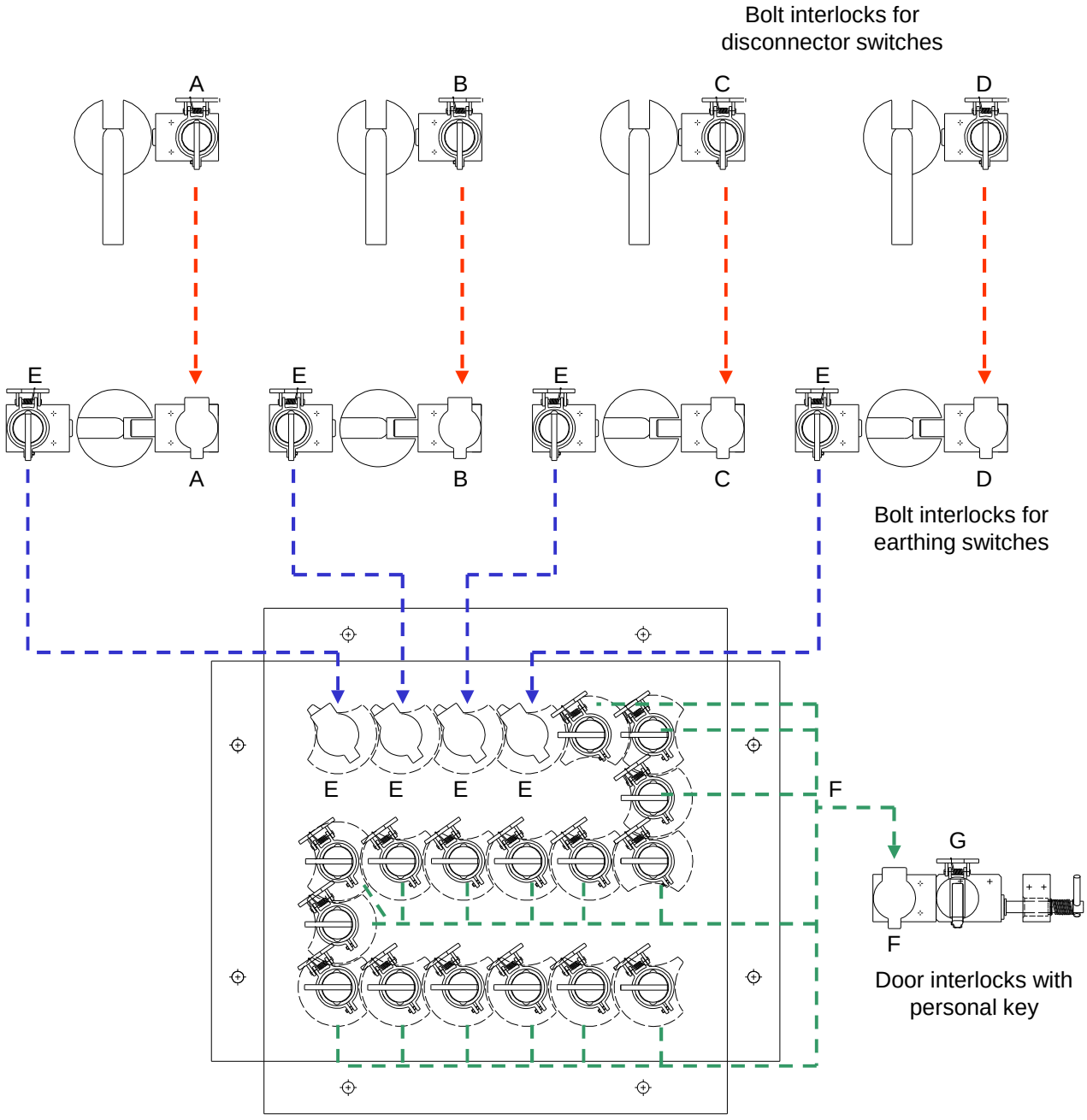
This example shows the more complex shutdown of a precipitator (high voltage) in a power station with disconnector switches and earthing switches and a multitude of access openings (manholes). Firstly, 4 disconnector switches should be switched off and interlocked with the aid of bolt interlocks. 4 earthing switches are then activated and interlocked via an exchange unit using these keys. The door interlocks on the manholes (full-body access) can then be opened using the freed keys and a key exchange unit.



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Firm: _____ **Name/Dept.:** _____ **Fax:** _____

1. Number of doors to be interlocked:_____

2. If more than one door has to be interlocked, should it be possible to open ALL doors simultaneously?

☐ **NO** ⟶ **No exchange unit necessary**

☐ **YES** ⟶ **Exchange unit necessary**

3. Is full-body accessing of the safety door possible (hazardous area can be viewed)?

☐ **NO** ⟶ **Single interlock version**

☐ **YES** ⟶ **Interlock with personal key necessary**

4. Interlock version (depends on safety door configuration):

☐ **Right** ☐ **Left** **e.g. standard interlock or with chain, slam-type interlock**

☐ **Top** ☐ **Bottom** **e.g. slam-type interlock**

5. What engraving (max. 5 digits) is required on the key, in the lock and on the dust cap? _____

6. Has the machine a running-down time, or is access to the safety doors enabled by the machine control?

☐ **NO** ⟶ **Single key switch**

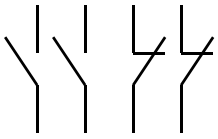
☐ **Mounted version in housing** ☐ **Integrated version for panel**

☐ **YES** ⟶ **Switch with solenoid** ☐ **24V DC** ☐ **110V AC** ☐ **230V AC**

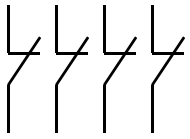
☐ **Mounted version in housing** ☐ **Integrated version for panel**

7. Desired contact configuration of built-in switch (for version with or without solenoid)

☐ **2 N.O. / 2 N.C. contacts**



☐ **4 N.C. contacts**



(N.C means: the contact opens when the machine has been switched off and the key removed.)

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