Ex-Proof Interlock Control System - Overview

The interlock control system for hazardous areas functions similar to the system with central controller. The control boards of all doors belonging to the interlock system are united in a casing. Whenever it is possible the central controller should be mounted outside the hazardous area. However, it also can be placed, together with the power pack, in an ex-proof casing and then be mounted within the hazardous area.

The ex-proof interlock control system allows to control a maximum of 5 doors in the hazardous area. But it is possible to extend the ex-proof interlock control system to up to 8 doors.

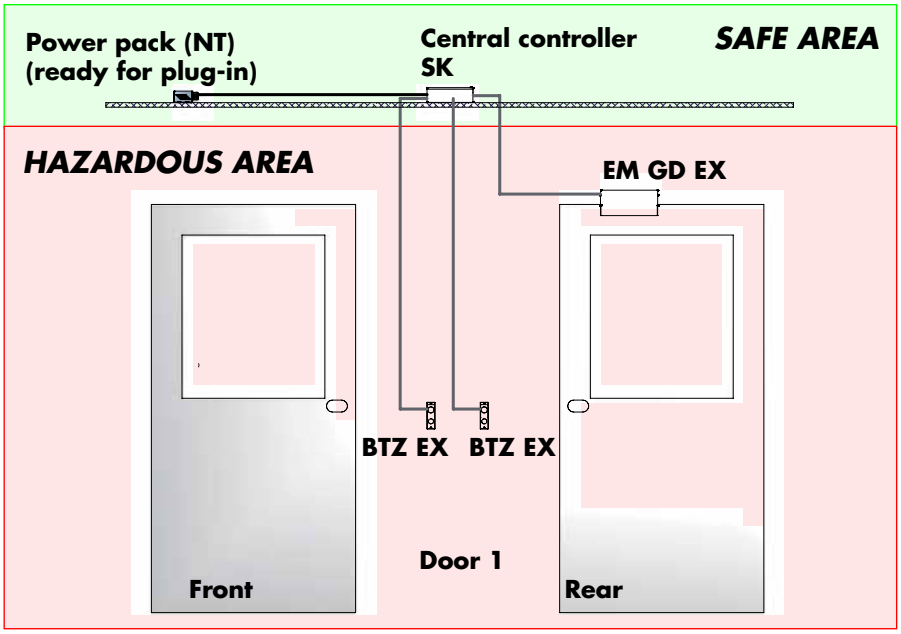
Basic Set-up

In the ex-proof interlock control system all feeding lines from the terminals and locking devices of the doors are directly led to the EX central controller and connected there. In hazardous areas flat cables and RJ45 connectors cannot be used.

On the doors is mounted the ex-proof operating terminal BTZ EX. Contrary to most ex-proof operating devices it is as small and aesthetically attractive as the terminals of the other DICTATOR interlock control system types. There are available two versions of the terminal BTZ EX. It always has an operating key to request the opening of the door and a LED light to indicate the status of the door. The light is either green or red, same as the illuminated ring of the door terminals of the other interlock control systems. On both sides of the door the same type of terminal is mounted. Both are directly connected to the EX central controller. In addition the operating terminal can also be equipped with an emergency-open switch.

As locking device is used an ex-proof DICTATOR electromagnet with separate feedback contact. Magnet and feedback contact are also directly connected to the SK central controller of the ex-proof interlock control system.

The power pack which is ready for plug-in supplies the power. Its safety plug is plugged in a socket on site. In the SK central controller is provided a socket for the power cable of the power pack.



Legend:

BTZ EX	= ex-proof operating terminal
EM GD EX	= ex-proof electromagnet

Ex-Proof Interlock Control System - Components

The ex-proof DICTATOR interlock control system consists of a few main components. Its structure is very simple. The system is also characterised by the extremely simple programming and the attractive, small terminals.

The standard version of the SK central controller and the corresponding power pack are intended for their mounting outside the hazardous area. In case that is not possible, both components can be mounted in an ex-proof casing.

System Components

SK Central controller
There is needed one SK central controller per system. The controller itself is not ex-proof (see above). Usually it can control up to 5 doors. But it is possible to enlarge the system. The following options exist:

- Connection of a second SK central controller. This allows to control 8 doors in the hazardous area.
- Connection of a distribution box of the peripheral interlock control system (see page 08.015.00). This allows to control in total 8 doors: 5 doors from the SK central controller and from the distribution box of the peripheral system 3 more doors which need a control terminal of the peripheral system and if necessary an operating terminal BT3 - see page 08.013.00 et sq.). These 3 doors, however, have to be located outside the hazardous area.
- Direct connection of a control terminal of the peripheral system (see page 08.013.00). This adds 1 door to a total of 6 doors. But also with this version the additional door has to be located outside the hazardous area.

To the SK central controller also doors outside the hazardous area can be connected (see information on peripheral and central interlock control system). But as the cables have to be connected in the SK central controller and cannot be plugged in there is needed an adaptor for the connection of flat cables with RJ45 connector.

Operating terminal BTZ EX
On every door in the hazardous area an operating terminal BTZ EX has to be fitted. The operating terminal is provided with the corresponding connection cables to the EX central controller.

Central power pack
The 24 VDC power supply of the SK central controller is provided by a power pack. It is available either with a power of 2.7 A or 5 A. The power pack is furnished ready for mounting with a mains cable with safety plug and a 2 m long 24 VDC cable with 6-pin connector to the SK central controller, i.e. it doesn't have to be opened for connection. The power pack is not ex-proof.

Door locking device
In the hazardous area an ex-proof electromagnet is used to lock the doors. Information about the magnet can be found beginning on page 08.032.00. In addition there is required a separate ex-proof feedback contact on the doors.

Time-delayed opening
In the SK central controller it can be adjusted that certain doors of the interlock system are released only after a delay. The remaining time, however, is not indicated in the interlock.

Information about more components for doors outside the hazardous area can be found on the pages about the peripheral resp. central interlock control system.

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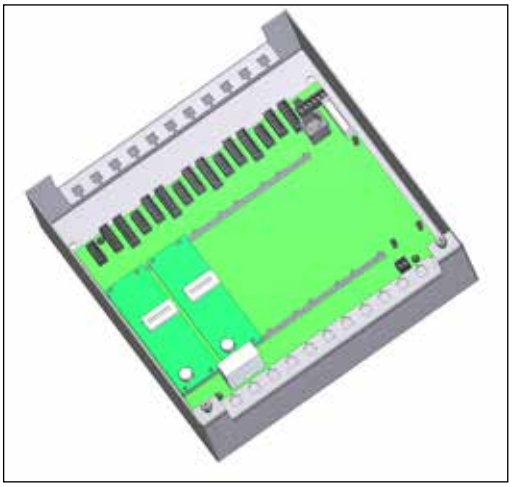
Ex-Proof Interlock Control System - SK Central Controller

In the ex-proof interlock control system all electrically relevant parts are combined in the SK central controller. The operating terminals are connected by screw terminals as hazardous areas require special cables and the flat cables of the not ex-proof version cannot be used. Apart from that the SK central controller corresponds mostly to the central controller RJ.

The standard version contains 2 control boards for 2 doors. In case the interlock system consists of more doors, the SK central controller will be provided with the corresponding number of control boards.

Structure



The SK central controller has been designed for systems with a maximum of 5 doors. But in case of need, with a second SK central controller you can control in total 8 doors in a hazardous area.

The SK central controller contains a basic circuit board on which is attached a control board for every door. Above each control board are 3 terminal strips:

- KL 1 to connect the ex-proof electro-magnet and the separate feedback contact,
- KL 6 to connect the luminous diode of the terminal,
- KL 11 to connect the Emergency-Open switch (of the operating terminal or a separate emergency-open switch)

The connection cable from the power pack is plugged in the 2 pin socket down in the right corner.

Options

Beside the basic functions a number of additional options are possible. Below are listed the most important ones with the necessary accessories.

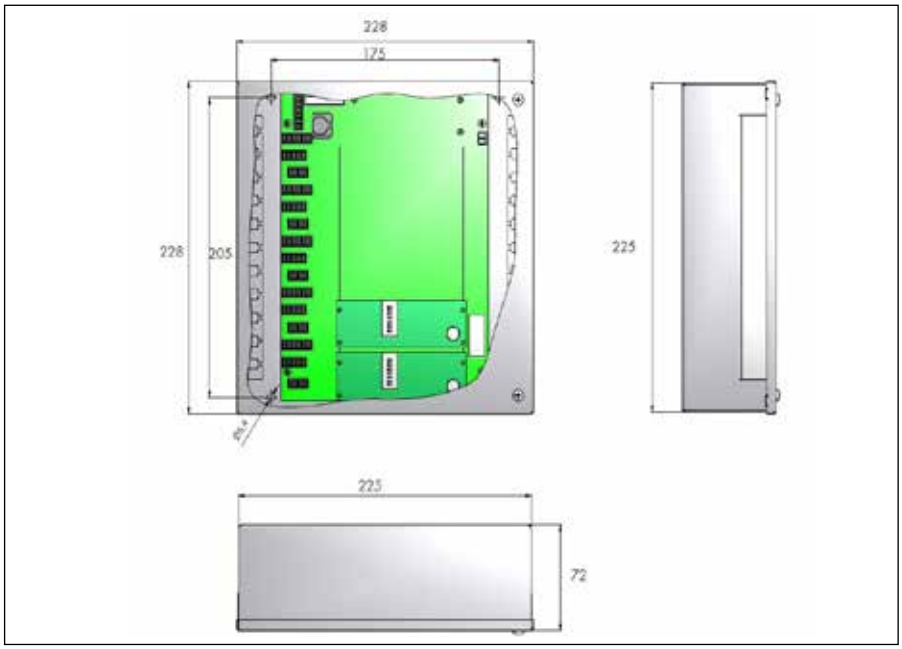
- ***Global Emergency-Open GNA***
  In case all doors of the interlock system should open once the emergency-open switch on one of the operating terminals has been pressed (global emergency-open), this can easily be achieved by adding a relay (part no. 710953) in the SK central controller. This relay is simply plugged in the provided socket.
- ***LAN module***
  It is possible to transmit status information and errors from the SK central controller to a facility mangement system. For this purpose the SK central controller can be up-graded in production with an additional circuit board (part no. 710954). This allows e.g. the facility management system to trigger an alarm, to pass an information to the ventilation system etc.
  The LAN module is not included in the standard version!
- ***Achieving special functions as e.g. the discretion circuit***
  For this purpose an 8-pin screw-type terminal is provided in the SK central controller.
- ***Time-delayed opening***
  In case it should be possible to reopen some doors only with a time delay, this can be adjusted by a jumper on the respective control boards.
- ***Integration of door operators***
  It is also possible to integrate door operators on (some) doors of the interlock system. In this case the terminals on the respective doors have to be without emergency-open and a separate emergency-open switch has to be mounted for the operator (e.g. ex-proof push-to-lock switch, part no. 700254, page 04.067.00).

Ex-Proof Interlock Control System - SK Central Controller - continuation

For systems with up to 8 doors the SK central controller can be upgraded in several ways:
- Connection of another SK central controller: max. 8 doors in hazardous area.
- Connection of a central controller RJ: up to 8 doors in total, max. 5 doors in hazardous area, rest outside hazardous area.
- Connection of a distribution box of the peripheral system: up to 8 doors in total, max. 5 doors in hazardous area.
- Direct connection of a control terminal of the peripheral system. This way the system can be enlarged by 1 door to a total of 6 doors, max. 5 doors in hazardous area.

Components of the peripheral system can be connected by using the adaptor with the part number 710964.

Dimensions



The strain relief of the incoming and outgoing cables is achieved by fixing the cables with tie wraps to the two cable support brackets. The cable inlets are sealed dust proof by cellular material.

To fix the SK central controller 4 borings of Ø 5.4 mm are provided in the casing.

If the SK central controller has to be mounted within the hazardous area, it is fitted together with the power pack into an ex-proof casing of the ex-protection type Ex II 2G Ex de IIC T6. The dimensions and the exact model depend on the number of doors the ex-proof interlock control system consists of.

Technical Data

Voltage	24 VDC +/-15 %
Power consumption basic version 2 doors	100 mA
Power consumption per additional door	50 mA
Power consumption relay for global emergency-open	30 mA
Power consumption LAN module	100 mA
IP rating	IP 20
Operating temperature	-10 °C to +40 °C
Material casing	hot-dip galvanized sheet steel
Max. cable length to terminals/locking devices	15 m
Fuse for connected EX magnets (per circuit board)	5x20 medium time lag, 200 mA
Ex-protection type of optional EX casing	Ex II 2G Ex de IIC T6

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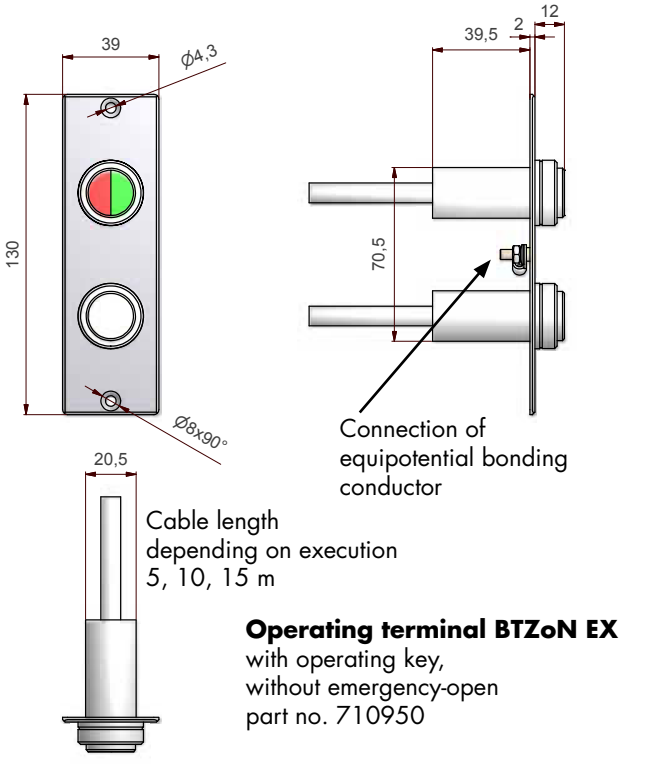
Ex-Proof Interlock Control System - Operating Terminal BTZ EX

A special feature of the ex-proof interlock control system are the operating terminals on the doors. They are as small, unobtrusive, elegant and suitable for clean rooms as the terminals of the "normal" DICTATOR interlock control systems.

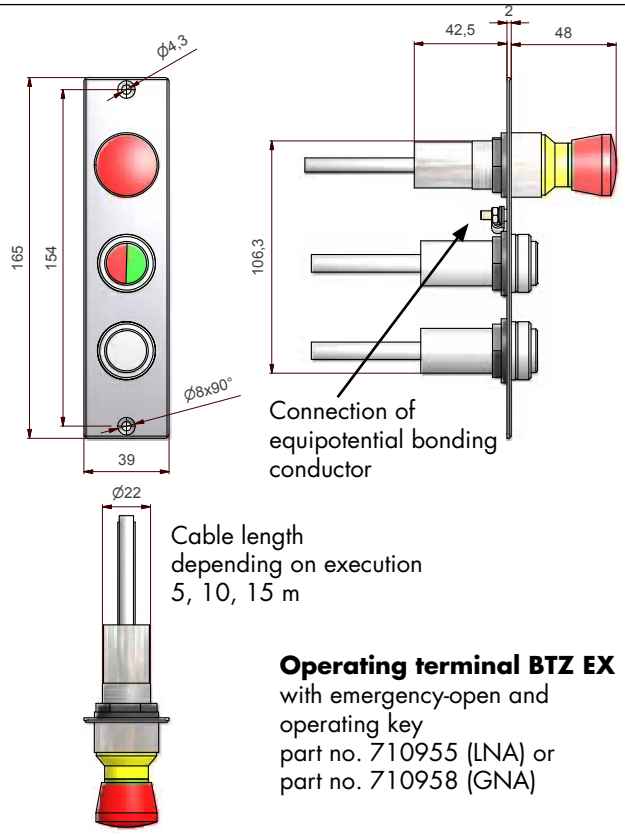
With the ex-proof terminals a separate luminous display indicates the status of the door. Depending on the status it shows a green or red light.

The terminals are furnished with cables for their connection to the SK central controller. When ordering the terminals please consider the required length of cable (5, 10 or 15 m).

Dimensions



Operating terminal BTZoN EX
with operating key,
without emergency-open
part no. 710950



Operating terminal BTZ EX
with emergency-open and
operating key
part no. 710955 (LNA) or
part no. 710958 (GNA)

The operating terminal EX is available with and without emergency-open switch. The type with emergency-open is slightly longer. Its front plate measures 165 mm instead of the 130 mm of the type without emergency-open switch. With the terminals with emergency-open switch you have to decide whether this switch should open only this (local) door (LNA) or all doors (GNA).

Technical Data

Power consumption	24 VDC +/-15 %, ca. 17 mA
Ignition protection type	EEx d IIC T6/T5
IP rating	IP 68
Operating temperature	-10 °C to +40 °C
Operating key	key 22
Luminous display	LED 22, two coloured green/red
Emergency-open switch	mushroom-type push-to-lock
Emergency-open switch contact set (capacity)	1 make/break, 1.5 A at 24 VDC
Material front plate	AISI 304 stainless steel

Ex-Proof Interlock Control System - Ex-Proof Electromagnet

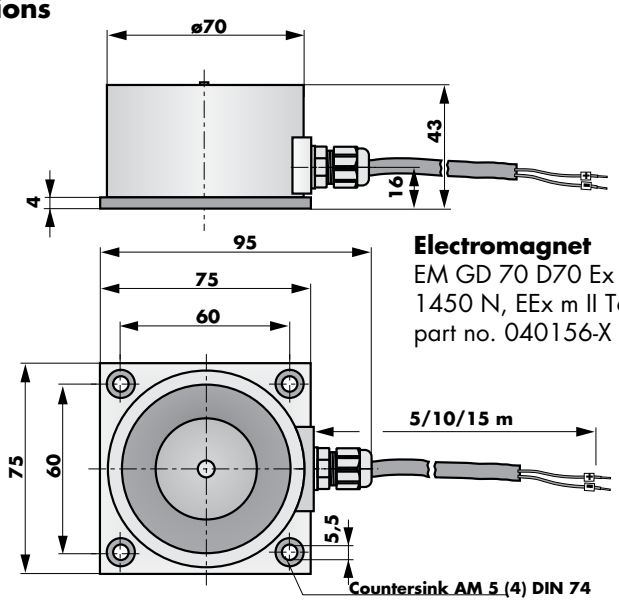
As locking device is mounted the tested and approved ex-proof electromagnet DICTATOR EM GD 70 with a holding force of 1450 N. If in case of special applications the holding force should not be sufficient, several electromagnets can be used.

The electromagnet comes with a cable that is connected to the SK central controller. Depending on the distance, cables of 5, 10 and 15 m length are available.

The electromagnet is registered at the PTB (German national metrology institute providing scientific and technical services) under the type-examination certificate PTB 03 ATEX 2174 X and the information of being conform with the PTB design 03 ATEX N060.

Ex-proof Electromagnet

Dimensions



Electromagnet
EM GD 70 D70 Ex 43m,
1450 N, EEx m II T6
part no. 040156-X

To accomplish the mounting every magnet needs a potential equalisation. On the mounting plates is provided a connection for connecting an equipotential bonding conductor (to be provided on site).

For safety reasons every magnet must have a superposed fuse, max. 3 x I_B according to IEC 60127-2-1, as protection against a short circuit. One fuse per door is already included in the SK central controller.

The ex-proof electromagnet EM GD 70 does not have an integrated feedback contact. This has to be mounted separately.

Technical Data

Supply voltage	24 VDC, ±15 %
Max. permitted ripple	20 %
Power consumption (±15 %)	70 mA (1.7 W)
Holding force / Remanence	1450 N / 0 N
Ex-protection	II 2G EEx m II T6
IP rating / Duty cycle	IP 66 / 100 %
Operating temperature	–20 to +40 °C
Finishing magnet	zinc-plated

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Ex-Proof Interlock Control System - Ex-Proof Electromagnet, continuation

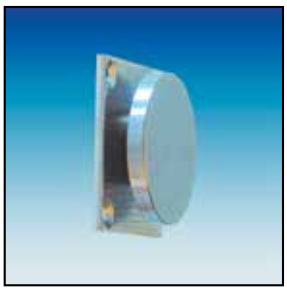
The electromagnet requires a counter plate. It has to be ordered separately.

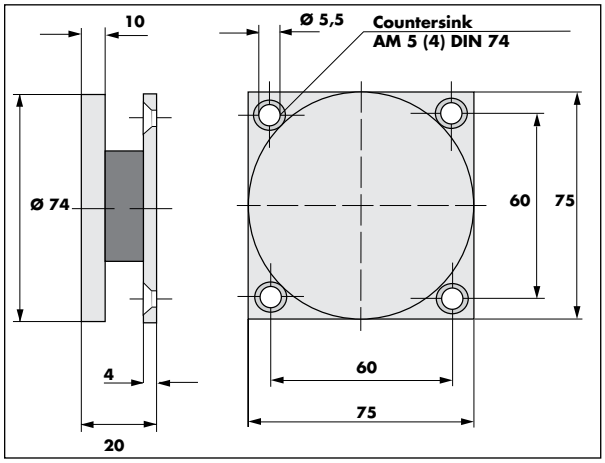
Depending on the mounting possibilities of magnet and counter plate different types of counter plates are available. They differ in respect of height (distance between mounting plate and counter plate), angle of inclination and type of suspension. The most used model is the flexible counter plate, part no. 040026.

Counter Plates for Ex-Proof Electromagnet

Flexible counter plate AP GD 70 G20

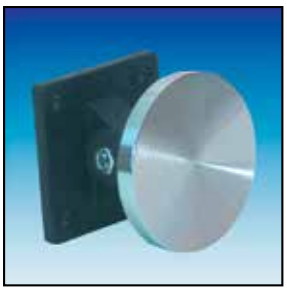
part no. 040026

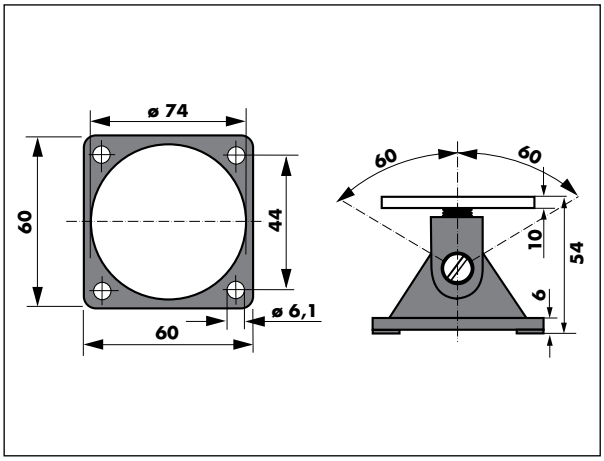




Counter plate with angular joint AP GD 70 W54

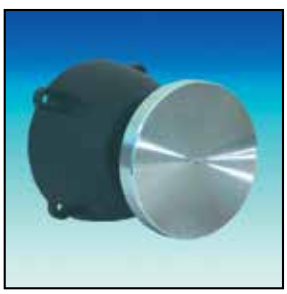
part no. 040068

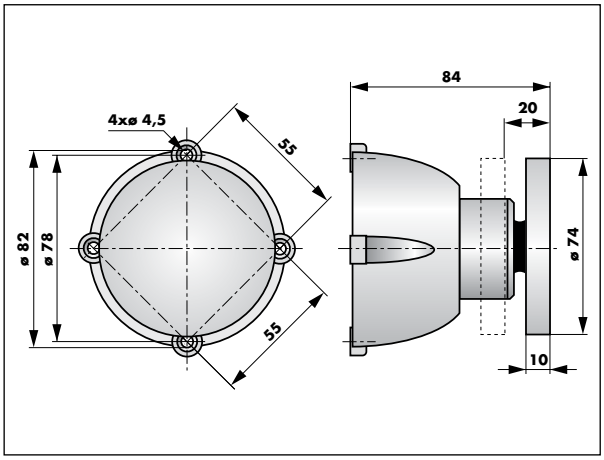




Telescopic counter plate AP GD 70 T84

part no. 040029





Ex-Proof Interlock Control System - Ex-Proof Electromagnet, continuation

For an easy mounting of the ex-proof magnet and the counter plate on the front side of the door (where the hinges are visible) a mounting kit (part no. 710962) is available.

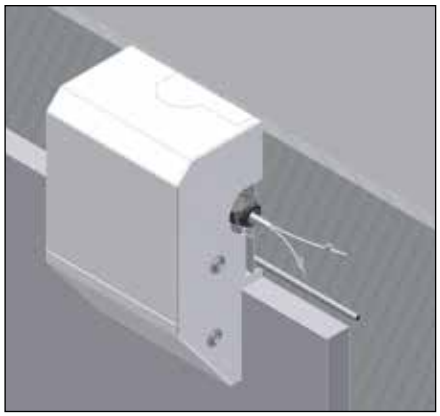
Once they are mounted, magnet and counter plate will be completely covered when the door is closed. This type of mounting is suitable for clean rooms.

There are also available two additional brackets (part no. 710963) which allow to integrate the ex-proof feedback contact (surface type, see next page).

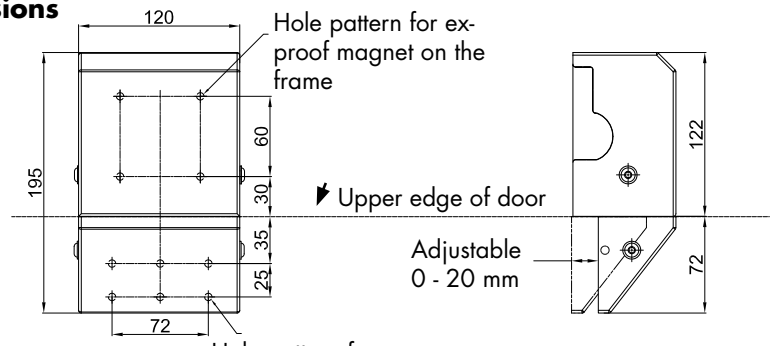
Mounting Kit

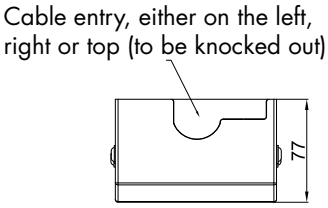
The electromagnet EM GD 70 Ex 43m is fixed to the door frame directly above the door. For the flexible counter plate, part no. 040026, the corresponding mounting bracket of the mounting kit is fixed on the door. To this is screwed the fastening bracket for the counter plate and to this the counter plate. It has to be made sure that it completely covers the electromagnet. Then the covers are fixed.

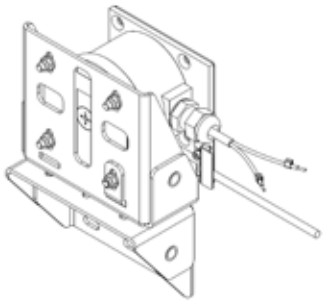
The surface of the covers is powder-coated in white (RAL 9010).



Dimensions







Technical Data / Components Included

Material	stainless steel AISI 430
Finish	powder-coated in white RAL 9010
Components 710962	fixing bracket counter plate, fixing bracket door, cover for ex-proof magnet, cover for bracket on door
Components 710963	mounting plate for feedback contact, fixing bracket for actuating magnet

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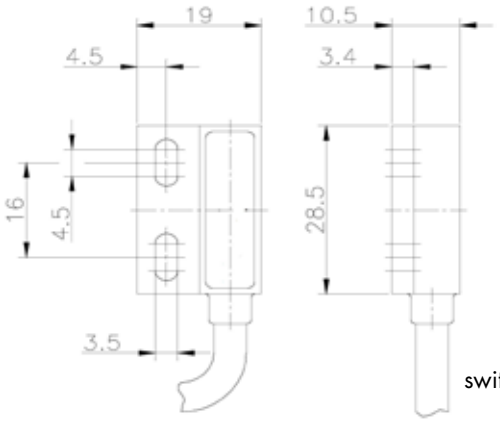
Ex-Proof Interlock Control System - Ex-Proof Electromagnet, continuation

The ex-proof electromagnet has to be completed by a separate, ex-proof feedback contact. It usually consists of a magnetic switch and the corresponding actuating magnet. The feedback contact has to be actuated when the door is completely closed.

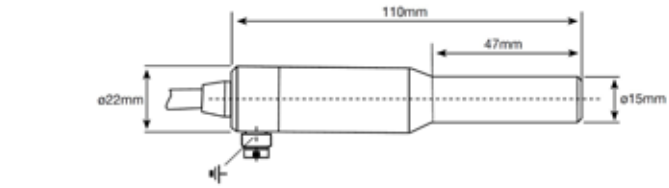
The feedback contact is connected directly to the provided clamps in the SK central controller.

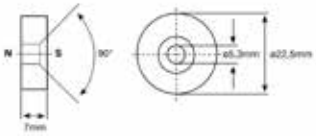
Ex-Proof Feedback Contact, Surface Type



Feedback contact, ex-proof, with switching magnet, for surface mounting
part no. 710956

Ex-Proof Feedback Contact, Flush Type





Feedback contact, ex-proof, with switching magnet, for flush mounting
part no. 710957

Technical Data

	Feedback contact surface, 710956	**Feedback contact flush, 710957**
Switching contact	1 make/break contact	1 make/break contact
Switching capacity	max. 3 W/VA	max. 50 W/VA
Switching voltage	30 V AC/DC	max. 250 V AC/DC
Switching current	max. 200 mA	max. 1.5 A
Operating temperature	–40 to +70 °C	-20 to +70 °C
Casing	plastics	nickel-plated brass
Connection cable	15 m, 3 x 0.34 mm²	15 m, 4 x 0.75 mm²
Ex-protection	II 2G Ex mb IIC T6 Gb	II 2G EEx m II T6
Switching distance	15 mm	8 mm

Ex-Proof Interlock Control System - Order Information

On this page you will find a summary of the part numbers of all components of the ex-proof DICTATOR interlock control system. If doors outside the hazardous area should be integrated in the interlock system, the corresponding part numbers will be found in the information about the peripheral or central system.

Other accessories:
- Power packs page 08.071.00 et sqq.

Order Information Terminals
(see page 08.031.00)

Operating terminal BTZoN EX with connection cable	5 m	part no. 710950
Operating terminal BTZoN EX with connection cable	10 m	part no. 710950-10
Operating terminal BTZoN EX with connection cable	15 m	part no. 710950-15
Operating terminal BTZ EX with connect. cable, LNA	5 m	part no. 710955
Operating terminal BTZ EX with connect. cable, LNA	10 m	part no. 710955-10
Operating terminal BTZ EX with connect. cable, LNA	15 m	part no. 710955-15
Operating terminal BTZ EX with connect. cable, GNA	5 m	part no. 710958
Operating terminal BTZ EX with connect. cable, GNA	10 m	part no. 710958-10
Operating terminal BTZ EX with connect. cable, GNA	15 m	part no. 710958-15

SK Central Controller
(see page 08.029.00)

SK central controller, no EX casing, 2 doors	part no. 710924
SK central controller, no EX casing, 3 doors	part no. 710924-3
SK central controller, no EX casing, 4 doors	part no. 710924-4
SK central controller, no EX casing, 5 doors	part no. 710924-5
SK central controller, in EX casing, 2 doors	part no. 710965
SK central controller, in EX casing, 3 doors	part no. 710966
SK central controller, in EX casing, 4 doors	part no. 710967
SK central controller, in EX casing, 5 doors	part no. 710968
Additional relay for global emergency-open, retrofittable, for central controller	part no. 710953
Additional circuit board (LAN module) for connection to facility management system, to be retrofitted in production	part no. 710954

Ex-Proof Electromagnet with Accessories
(see page 08.032.00 and following)

Electromagnet EM GD 70 Ex43m, 1450 N EEx m II T6, length of connection cable	5 m	part no. 040156-05
Electromagnet EM GD 70 Ex43m, 1450 N EEx m II T6, length of connection cable	10 m	part no. 040156-10
Electromagnet EM GD 70 Ex43m, 1450 N EEx m II T6, length of connection cable	15 m	part no. 040156-15
Counter plate for electromagnet AP GD 70 G20		part no. 040026
Counter plate for electromagnet AP GD 70 W54		part no. 040068
Counter plate for electromagnet AP GD 70 T84		part no. 040029
Mounting kit for ex-proof electromagnet		part no. 710962
Feedback contact (surface) bracket for mounting kit		part no. 710963
Ex-proof feedback contact, surface mounting		part no. 710956
Ex-proof feedback contact, flush mounting		part no. 710957
Adaptor from RJ45 jack to 8-pin screw terminal incl. 250 mm of flat cable with RJ45 connectors		part no. 710964

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