
Fixing of interlocking devices for safety functions

There are every now and then uncertainties about the fixing of these components during the montage of safety switches, safety interlocks, roller switches and contact-free safety switches.

This document shall give you a hand about this topic.

The DIN EN 1088 requires definitely the prevention of the self-loosing and the easy avoidance (the easy manipulation) of the **encoders** and its **operating elements** ¹⁾ as well as the use of mounting elements which cannot be removed or loosed easily ²⁾.

Simultaneously, the typical kinds of "Avoidance in a reasonably foreseeable way" are defined in the standard ³⁾.

A typical kind ... can be an intended try to avoid an interlocking device either by hand or by using an easily available object. Easily available objects can be:

- Screws, needles, sheet metal parts;
- objects of daily use like keys, coins, adhesive tape, string and wire;
- Spare operating elements or spare keys for interlocking devices with key transfer systems
- tools which are necessary for the intended use of the machine or ones which are easily available (e.g. screwdrivers, spanners, hexagon wrenches and pincers).

Please note! The "Avoidance in a reasonably foreseeable way" also includes the removing of switches or operating elements by means of tools which are mentioned above and with the intention to disable (manipulate) an interlocking device.

As adequate security measures, the hidden (half-blind) fitting and the use of riveted, welded or glued connections, one-way screws, etc. will be listed in several points of the norm.

Annotation: *Today, the buying market offers a multitude of safety screws and pull-off nuts which are characterised by easy use. They are also adequate as security measures.*

Furthermore,

- measurements against changes of position (BGI 575)
 - measurements against changes of position at proximity switches [contact-free safety switches] (BGI 670)
- are concerned in points 6.2.

1) DIN EN 1088 P5.2

2) DIN EN 1088 P5.7.2 ff.

3) DIN EN 1088 P5.7.1.

BGI 575: Choice & installation of electromechanical interlocking devices for safety functions.

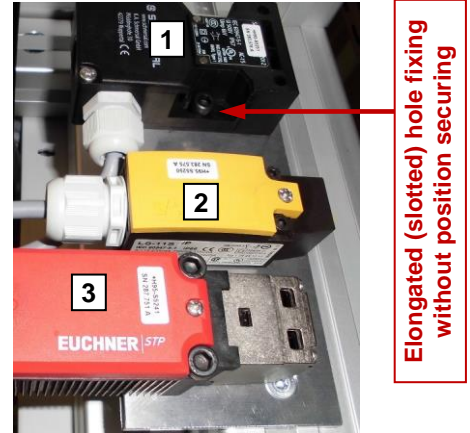
BGI 670: Choice and installation of proximity switches for safety functions.

In order to fulfill these points, we recommend to fix safety switches, interlocking devices, actuators as well as their mounting plates as follows:

Examples:

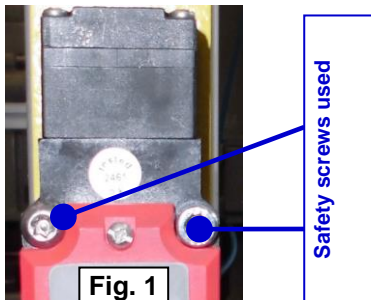
Depiction of an inadequate fixing

- All switches have been fixed with normal screws and are easy to manipulate.
- Switch no. 1 has been fixed in the slotted holes and a position securing was not attached. Therefore, a change of position is possible at any time.

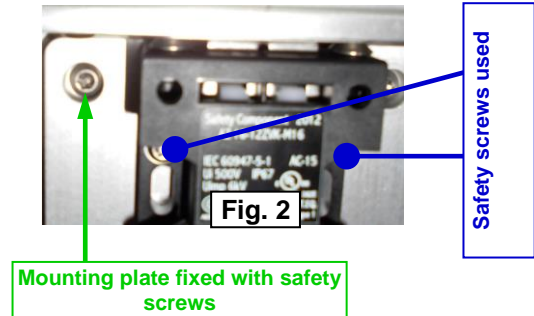


Depiction of an optimal conform fixing

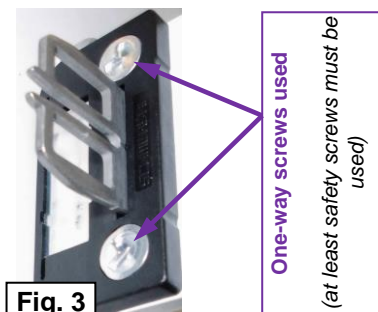
- Figure 1: Switch has been fixed with safety screws



- Fig. 2: Safety switch in round holes (for position securing) fixed with safety screws.



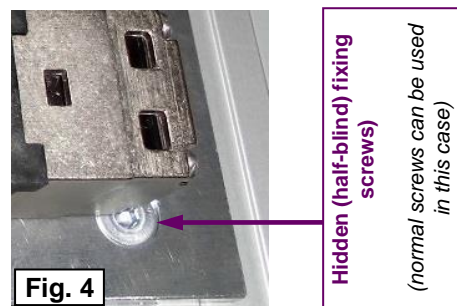
- Figure 3: Operating element has been fixed with one-way screws



Mounting plate with accessible fixing holes is fixed with safety screws against a manipulation.

Switch has to be removed before the plate can be dismantled.

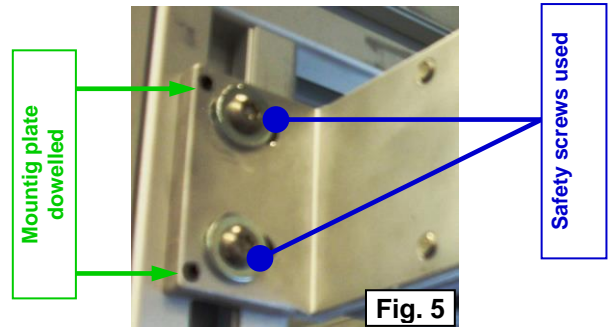
- Figure 4: Mounting plate with hidden (half-blind) fixing holes



Depiction of an optimal conform fixing (continuation)

- Figure 5: Mounting plate with exposed (accessible) fixing holes and slotted hole fixing.

Mounting plate mounted with safety screws and double dowelled because of the horizontal (slotted holes in plate) and vertical (notch of profile) slotted hole fixings in order to prevent a change of position.



Information about safety screws and pull-off nuts

You can find further information about this for example at the following web page www.Sicherheits-Schrauben.de.



Safety screw
(example view)

Pull-off nuts
(example view)

Abreißmuttern sind mit Standardwerkzeug leicht zu montieren.
Nach dem Abbrechen bleibt eine konische Mutter zurück, die sich mit Standardwerkzeug nicht mehr demontieren lässt.

Size	Shear-torque	A	B	C	Ref. no.
M6	8-10 Nm	10 mm	6 mm	10 mm	174 109
M8	17-21 Nm	13 mm	6 mm	13 mm	174 114
M10	32-38 Nm	19 mm	8 mm	19 mm	174 118
M12	47-55 Nm	22 mm	9 mm	22 mm	174 124

Additional information about secure measurements against changes of position

Extract of BGI 575

Sichern gegen Lageänderung (Fixierung)

Zum Sichern gegen Lageänderung von Positionsschaltern für Sicherheitsfunktionen sind beim Einbau formschlüssige Befestigungen vorzusehen, z.B.

- durch Rundlöcher,
- durch Langlöcher mit zusätzlicher Verwendung von Passstiften oder Anschlägen.

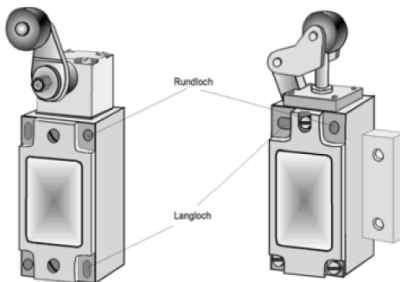


Bild 27: Beispiele für mögliches Sichern gegen Lageänderung

Sofern verschiebbare Positionsschalter auch Aufgaben des Personenschutzes übernehmen, dürfen sie sich nicht so weit verschieben lassen, dass Gefährdungen entstehen können. Dies lässt sich beispielsweise durch einen formschlüssigen Anschlag oder durch eine geschlossene Führungsschiene erreichen.

Extract of BGI 670

Sicherung der Befestigungselemente des Näherungsschalters und des Betätigers gegen Selbstlockern und Lageänderung

Näherungsschalter für Sicherheitsfunktionen in Verriegelungseinrichtungen müssen justiert und fixiert werden können. Es müssen Maßnahmen gegen Selbstlockern des Sensors und des Betätigers z.B. durch Sicherungsbleche, Schweißpunkte, Gießharzverbindungen getroffen werden.

Zum Sichern gegen Lageänderungen sind beim Einbau von Näherungsschaltern formschlüssige Befestigungen vorzusehen, z.B. Rundlöcher, Passstifte u.s.w.

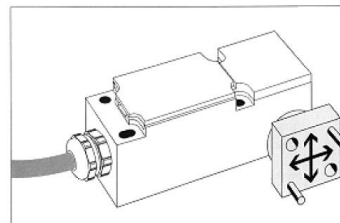


Bild 6: Beispiel für mögliches Sichern gegen Lageänderung

Sources

- DIN EN 1088: Safety of machinery – Interlocking devices associated with guards ...
- BGI 575: Choice & installation of electromechanical interlocking devices for safety functions
- BGI 670: Choice and installation of proximity switches for safety functions