FAQs

Safeguarding Machines with Hard Guards and Solenoid Locking Switches

What is the easiest way to protect a dangerous area on my machine?

Hard guarding is a very common approach to providing protection for both the visible and invisible hazardous areas of a machine. It can be made with a variety of materials including metal screening or clear plastic to allow visibility. The only limiting factor is that the material must be strong enough to contain the impact from any debris that could possibly be ejected during the manufacturing process or in the event of the potential breakage of any internal components. Fixed hard guarding is generally preferred due to its simplicity; however, since this prevents access to the machinery for maintenance, repairs, adjustments or product manipulation, other alternatives may need to be considered.

What if I need to access these areas?

Incorporation of a door or removable access panel can be added, so long as assurances can be made that the door or access panel is closed when the dangerous condition is present. Incorporating interlock switches is a common approach as they monitor the position of the guard. There are several different types of interlock switches available, including keyed safety switches, non-contact safety switches, and hinged safety switches. Standard switches provide one or two closed contacts when the door or panel is in place, thereby blocking the hazardous condition. Usually these are connected in series, forming a one- or two-looped safety circuit which is monitored by a safety relay or safety PLC. Typically these monitoring devices shut off the power, stopping the dangerous moving parts and preventing the start of the machine when the guard is opened or removed.

What if my machine takes a long time to stop?

Unfortunately, due to inertia some machines may continue to run after their power is disconnected. This can create a situation where it is possible to access the hazardous areas of the machine when they are still in a dangerous state. Examples of this include saws, fly wheel devices, and K presses. To eliminate this possibility, the guards must be placed at a sufficient distance to allow enough time for the process to stop completely before the operator is able to access it. This safety distance can be calculated based on the time it takes to open the guard, the response time of the safety relay, and an average hand speed constant.

Another approach is to simply lock the guard or close the gate, allowing the machine enough time to safely wind down. This can be easily accomplished using solenoid locking keyed interlock switches. These switches use a solenoid mechanism to lock a door-mounted activation key into the switch, preventing the guard, gate, or door from being opened.

What type of locking functions are available?

Solenoid switches are available either “Normally Locked”, where the keys are locked into the switches automatically and the solenoid must be powered to remove them, or “Normally Unlocked”, which requires power to the solenoid to lock the keys into the switch.

How do I control a solenoid locking keyed safety switch?

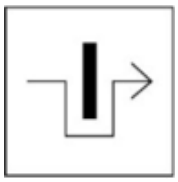
Typically, the power to the locking solenoid is controlled using a zero-speed device to sense that all the dangerous motion has stopped, or else a PLC or timer to ensure that enough time is provided for the machine to come to a complete stop.

What happens if I lose power?

Most Normally Locked solenoid locking switches include an “emergency override” which allows the locking actuator key to be removed manually in the event of a power failure. These are designed for emergency use only and usually require the use of a separate tool like an Allen wrench to open. If quick access to the override is required, some switches offer an optional hand-operated manual override, which can only be reset with a special tool.

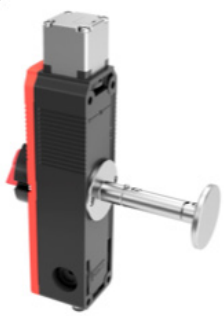
What the difference between “Key Contacts” and “Locking Contacts”?

Many solenoid locking switches are available with multiple contacts that offer separate outputs indicating when the key has been properly inserted into the switch and if the key has been locked. Older generations of switches sometimes required the “key contacts” and “locking contacts” to be run in series to reach the highest safety levels. Newer switches feature a fail-safe locking design which integrates both functions into one contact indicating that the key is both in place and locked. There is a new symbol according to ISO 14119 used to designate these fail-safe contacts.



What if I get trapped behind the guard?

One danger with locking a door or gate closed when guarding an area large enough to allow full body access (like a robotic manufacturing cell), is that it would be possible for the operator to be accidently locked inside in the hazardous area. Since the locking control and switch override would be outside of the cell, the operator would have no means of accessing them and, therefore, no means of escape.



Some solenoid locking switches are available with optional emergency escape override accessible from the back of the switch. When mounted, the escape override extends through the guard, giving the operator access to unlock the switch from within the cell.

Can I use a keyed interlock switch as a latch?

Neither non-locking nor locking keyed interlock switches are designed to be used as physical stops for the doors or gates. This is especially true with larger heavy door and gate designs. Many switches offer separate hardware that can be used in conjunction with the switches, so as to support the weight and forces required to secure the gate. These units, typically referred to as "slide bolts" or "shock bolts", are equipped with a handle to allow the operator to open and close the gate by hand when unlocked.

Can I use these switches with an extruded aluminum rail guard?

Many solenoid locking switches are now vertically designed to make them much easier to mount on extruded aluminum rail systems, which are very popular for hard guarding applications. Some also feature a combination of plastic and metal in their construction components to make them both durable and cost-effective.