

Guard Interlocking — Key-Operated Safety Switches, Solenoid Locking and Coded Magnetic Sensors

cBallast Technical Sourcing · Safety interlock switches · issued 2026-10-03 · cballast.com/documents/safety-interlock-and-magnetic-switches

Interlocking movable guards per ISO 14119: tongue (key) operated safety switches, solenoid-locked versions that hold the door until the hazard stops, coded magnetic switches that resist defeat, actuator keys and sliding-bolt accessories, with the stocked XCS/XCSDM range.

What ISO 14119 asks of a guard switch

A movable guard's interlock must (a) signal guard position through positively driven contacts or an equivalently reliable principle, (b) resist reasonably foreseeable defeat (taped actuators, spare keys), and (c) where hazards outlast opening time, lock the guard shut until the hazard clears. Those three demands map to the three device families below.

Tongue (key) operated switches

The actuator key, bolted to the door, enters the switch head and rotates a cam that positively opens NC contacts — no spring to fail shut. Stocked examples: plastic-body XCSMP79 (2NC, 2 m cable) and XCSMP59 (NC+NO); glass-filled and metal families with conduit entries (XCSPA592 M16, XCSPA593 1/2" NPT); metal key-interlocks with cable (XCSM4110 2NC+2NO, 5 m). Keys are consumables and alignment parts: straight (XCSZ81) and the sliding-bolt kit for doors that rattle (ZCKY101 slide bolt with key). Mount so the key enters within its radius tolerance; a door that sags turns keys into shear pins.

Solenoid-locked switches

Where a machine coasts, add guard locking: the switch holds the key until the solenoid releases. XCSL764B2 (24 V DC, metal, M20) is the stocked pattern — principle "operating current" (energise to release), so supply failure leaves the guard locked; combine with a standstill or time condition that de-energises only when safe. Specify the holding force against the door's leverage, duct the cable clear of the hinge sweep, and include the manual escape release where someone could be trapped inside the cell.

Coded magnetic switches

Where hygiene, misalignment or hidden mounting rule out tongues, coded magnetic sensors pair a multi-pole coded magnet with a sensing body — no penetration, washdown-proof, tolerant of sloppy doors, and defeat-resistant because a shelf magnet won't match the code. Stocked rectangular and cylindrical formats: XCSDMP5005 large, 2NO/1NC, LED-indicating M12 versions (2NC+1NO, 1NC+1NO, 1NC+2NO), cylindrical M30 (1NC+1NO LED M12, 2NO 10 m cable, with LED, 5 m). Their contacts are not positively driven, so evaluate them in the safety loop (typically via a safety relay cross-monitoring two channels) at the PL the risk assessment demands — the switching-distance ON/OFF gap in the data governs mounting.

System design notes

Two channels for PL d/e: 2NC through a monitored safety relay; the stocked contact sets (2NC, 2NC+1NO...) exist for exactly this.

Series-connecting doors hides single faults; keep strings short or use devices/diagnostics designed for series duty.

Defeat resistance: fit keys with security screws, select coded magnets over plain reeds, and locate bodies out of casual reach — ISO 14119's hierarchy in practice.

Safety limit switches (positive-opening plunger/roller forms, e.g. XCSD3910 2NC+1NO, XCSPL791 lever) guard hinged covers and telescopic ways where a tongue cannot fit.

Document device PL/B10d data, channel architecture and test intervals in the safety file; for the curtain side of cell guarding see the light-curtain guide.

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