

Machine Safety Switches – Magnet Style

Sensor and Magnet Installation

Magnetic style safety switches are easily mounted on the inside edge of most guards. Inside mounting can often hide them from view and discourage tampering.

All mounting hardware is supplied by the user. Use of permanent fasteners or locking hardware is recommended to prevent loosening or displacement of the actuator and switch body. Mounting holes in the magnet and sensor accept M4 (#6) hardware (see drawings, on page 8).

Position the magnet and sensor in the mounting location with the magnet surface directly opposite the sensing surface (see dimension drawings). Leave a slight gap (up to 3 mm or 0.12") between the magnet and sensor surfaces, so that the magnet and sensor do not act as an end stop when the guard is closed. Mark the mounting holes. Fasten the magnet and sensor in place. After the mounting hardware is secure, check the magnet and sensor alignment and sensing gap. Neither is critical, but the gap should be less than 3 mm (0.12") for reliable sensor actuation.

Route the sensor cable to the controller location. The controller must be installed inside an enclosure. It is not designed for exposed wiring. It is the user's responsibility to house the controller in an enclosure with NEMA (or IEC) rating which is suitable for the operating environment. The controller mounts onto standard 35 mm DIN rail.

Note: The typical direction of approach of a magnet to its corresponding sensor is normally perpendicular to the sensing face and the magnet surface (see dimensional drawings on page 8 and Figures 2a, 2b and 2c, "Direction of Approach on page 6). Alternate directions are possible (e.g., sideways or parallel), though the speed of approach must be fast enough to meet the simultaneity-monitoring period of 0.5 seconds. This speed is approximately equal to or greater than 0.2 m (8"/s). If the simultaneity is not met, the MAG1C controller will not close its safety output contacts, even if the "sensor" indicator is OFF.

IMPORTANT NOTE: If the sensor or magnet is mounted on a material that can be magnetized (e.g., ferrous metal, such as iron), the switching distance will be affected. The sensor and magnet must be mounted a minimum distance of 15 mm (0.6") from magnetized or ferrous materials for proper operation.

IMPORTANT NOTE: The magnet and sensor are coded to minimize the possibility of false actuation. Nevertheless, they should not be used within known fields of high-level electromagnetic radiation. The magnet and sensor must never be used as a mechanical stop.

Electrical Installation

Each controller is powered by 24V dc (at less than 100 mA). The controller, in turn, supplies power to the sensor.

As illustrated in Figure 1, the safety output (terminals 71 and 76) from each of **two safety switches per interlock guard** must connect to a 2-channel safety module or safety interface in order to achieve a control reliable interface to the master stop control elements of a machine. Examples of appropriate safety modules include 2-channel emergency stop (E-stop) safety modules and gate monitor safety modules.

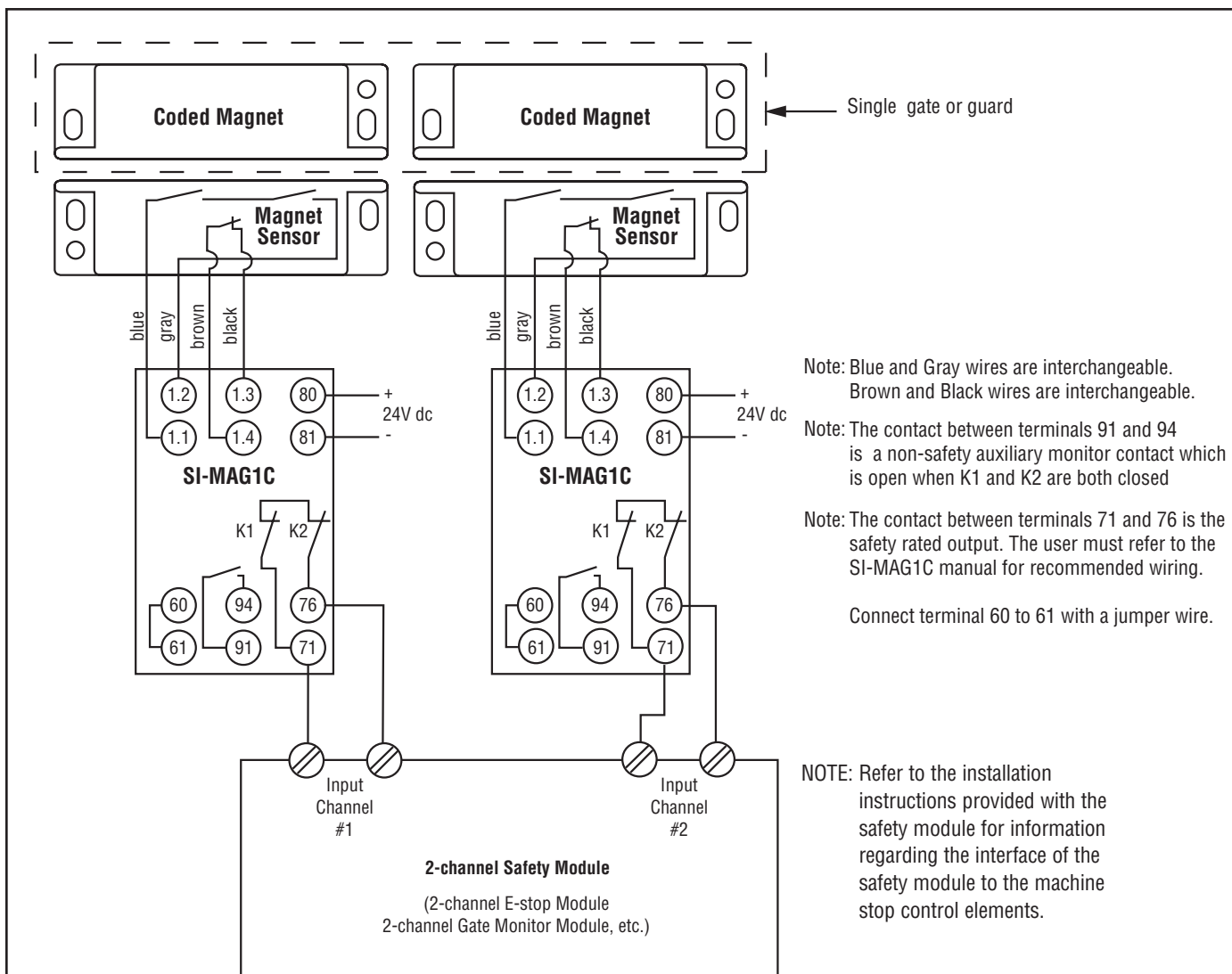
Two functions of the safety module or safety interface are:

- 1) to provide a means of monitoring the contacts of both safety switches for contact failure, and to prevent the machine from restarting if either switch fails;



WARNING!
It must not be possible for personnel to reach any hazard point through an opened guard (or any opening) before hazardous machine motion has completely stopped. Please reference OSHA CFR 1910.217 and ANSI B11 standards (see page 2) for information on determining safety distances and safe opening sizes for your guarding devices.

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IMPORTANT NOTE: Be certain that all wiring conforms to all relevant wiring codes.



CAUTION! Control Reliability ...

Two safety switches must be used per interlock guard to achieve control reliability of a machine stop circuit. Use of only one safety switch per interlock guard is not recommended.

In addition, normally-closed safety contacts from each of the two safety switches must be individually connected to the two separate inputs of a 2-channel safety module or safety interface, as illustrated in Figure 1. This is required to provide monitoring for safety switch contact failure, and to provide the necessary reset routine, as required by ANSI B11 and NFPA 79 machine safety standards.



CAUTION! Connection of Multiple Safety Switches to one Safety Module Input Channel ...

To meet control reliability, **never connect more than one safety switch contact to one input channel of a safety module or safety interface.** To do so defeats the ability of the safety module to monitor each contact for failure, and results in a machine stop control circuit which is **not** control reliable.

Figure 1. Connect two redundant safety switches per interlock guard to an appropriate 2-channel input safety module.