Data Sheet

‘Sentinel+’ 4-channel electronic machine guard system

RS stock numbers 324-766, 342 -887

Guarding requirements

Safety is today one of the major considerations in industry. It is generally accepted and rigidly enforced that no one should be injured or killed in the course of their daily employment. All machinery either at design, manufacture or installation, will be subject to legislation introduced to protect the operator from the dangers of the machine.

Evaluating the potential hazard provided by a machine is the first step towards adequately safeguarding it. Two major criteria must be considered when assessing the risk factor of the machine. These are:

a) The probability of an injury occurring and

b) The degree of likely injury.

If a multi-access machine is assessed and considered to require efficient safeguarding then the Sentinel+ 4-channel electronic machine guard system may provide a failsafe high integrity solution to the problem.

General

The multi-access Sentinel+ machine guard interlocking system offers cross monitoring and self checking on both opening and closing of various types of machine guards, whether hinged, sliding or lift off.

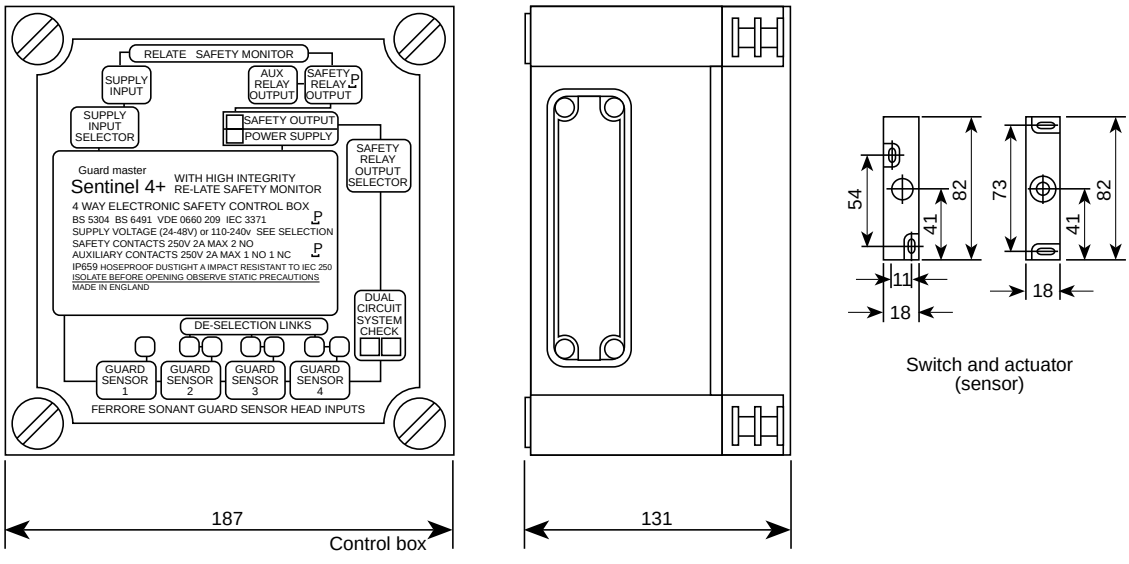
The system consists of a control box (RS stock no. 324-766) capable of controlling and monitoring up to four safety sensors (RS stock no. 342-887) mounted at the opening edge of the guards. These miniature safety sensors incorporate a unique dual ‘ferroresonant’ actuating system making them extremely difficult to defeat. Operating on low voltage the sensors are immune to interference, tolerant to misalignment and simple to install even in sensitive and hazardous areas.

Unlike other electronic systems the Sentinel+ does not transmit a frequency from the sensor back to the control unit virtually eliminating any chance of interference. This also means that the length of the cable between the sensor head and control unit is not a critical factor.

Features

- High integrity, fully cross monitored
- Self checking in both opening and closing guards
- Very tolerant to misalignment of sensor and actuator
- Sensors environmentally protected to IP67, enclosure protected to IP65
- Developed in co-operation with HM Factory Inspectorate and conforming to BS5304 and 6491
- Full system indication giving instant visual guide to machine condition
- Failsafe operation
- Sensors and control box housed in insulated, impact resistant, non-corroding enclosures
- Dual safety circuits for high risk, dual contactor applications
- Prime/safety feature on sensing head ensures complete immunity from stray signals
- Patented Re-late® safety output relay monitor.

Figure 1



Operation of system

Each safety sensor incorporates a unique dual coded 'ferroresonant' field sensing system using both tuned frequency resonant coils coupled with a magnetic actuator. These systems are not only totally independent of each other but must activate the switch in the correct sequence. In practice this means that, on closing of the guard the actuator's initial field primes the switch, enabling it to be activated by the secondary field at a typical switching distance of 10mm.

Only when all the guard inputs have been received by the controller will the final safety relay close, energising the machine. As the system is constantly monitored on the opening and closing of the guards, in the unlikely event of any component on either controller or sensors failing, the system will immediately failsafe. More importantly, the system will indicate the failure and will not allow the machine to restart, eradicating deliberate or accidental interference from external sources as all inputs are monitored and indicated. The unique Re-late® monitor system checks the safety relays and, in the event of failure, will shut the whole system and the machine down.

Installation

The controller is housed in a clear lidded, compact, polycarbonate enclosure sealed to IP65 and provided with two conduit plates which can be drilled and fixed to any of the 4 knock-out blanks. The controller can either be mounted on view near the machine to give instant indication of the machine and safety system condition or enclosed in the machine control cabinet.

Each switch and actuator consists of a miniature red ABS moulded housing sealed to IP67, which features moulded-in mounting brackets allowing both switch and actuator to be secured in any position with the tamper resistant screws provided. The only consideration is that the two target faces are reasonably aligned when the guard door is closed. Mis-alignment tolerance on closing the switch is typically ±6mm. Once the switch has been actuated this tolerance increases to ±10mm to eliminate nuisance tripping due to machine vibration etc.

For systems requiring less than four machine guard sensor inputs the appropriate number of supplied 'deselector' links must be installed. These links can be removed at a later stage if the number of sensors is required to be increased.

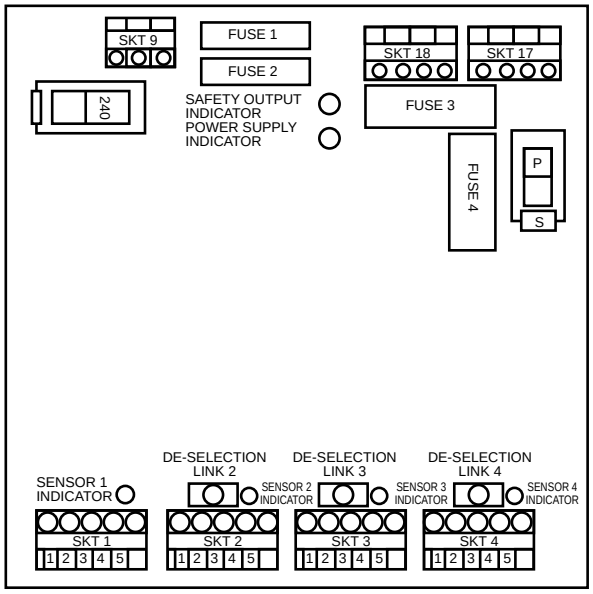
Where more than four safety sensors are required a further control box is required with the safety relay contacts connected in series.

The supply voltage to the control box can be 110V or 240Vac 50Hz, selectable via a switch mounted on the pcb.

The protected safety contacts are uncommitted and will switch any voltage up to 250Vac 50Hz at 2A max. The dual safety circuit output can be switched to either series or parallel mode to accommodate machines with either a single control circuit, or dual control/high risk circuitry. The independent auxiliary signal contacts (one pair N/O and one pair N/C) are similarly rated.

In addition to indication of sensor inputs at the control

Figure 2 PCB layout



box an led is mounted on each sensor housing giving instant indication that the guard door is correctly closed and the switch operated.

Technical specification

Control box

Supply voltage ____ 110Vac 50 Hz 250mA
or
240Vac 50 Hz 100mA } switchable

Safety output contacts ___ 2 x 250Vac/dc 2A max. N/O (either series or parallel)

Signal output contacts _____ 250Vac/dc 2A max. 1N/O and 1N/C

Operating temperature range _____ -10°C to +55°C

Environmental protection _____ IP65

Fixing _____ 4 × M5

Case material _____ Moulded polycarbonate

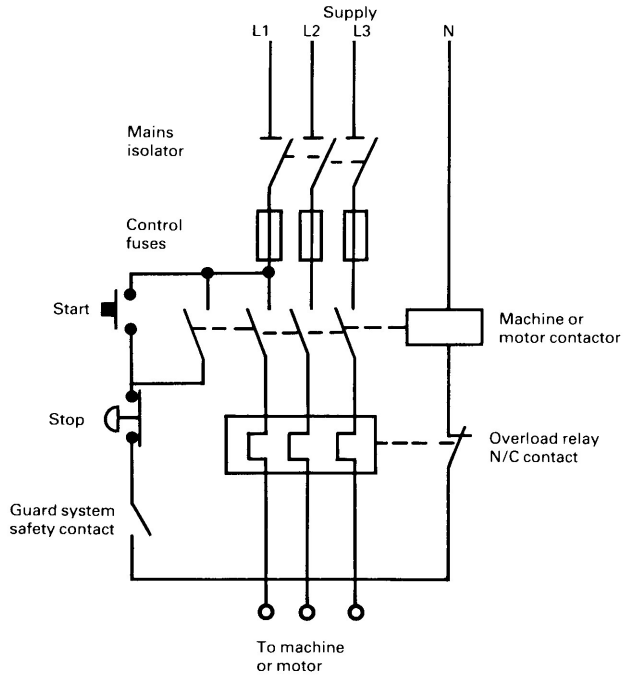
Safety sensor

Operating distance _____ Make 10mm Break 14mm

Misalignment tolerance _ Make ±6mm Break ±10mm

Operating temperature range _____ -10°C to +55°C

Figure 3 **Typical machine circuit diagram**



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