# Safety Interlock Switch
# HS-SS-Z / HSM-Z Operating Instructions


HSM-Z (Die Cast)


HS-SS-Z (Stainless Steel)

**Read and understand these instructions before installing, operating, or maintaining this equipment.**
These products are designed to be a component of a customised safety orientated control system. It is the responsibility of the user to ensure the correct overall functionality of its systems and machines. IDEM, its subsidiaries and affiliates, are not in a position to guarantee all of the characteristics of a given system or product not designed by IDEM.

**Application:**
HS-SS-Z and HSM-Z Hinge Switches are designed to be mounted for interlock position sensing of hinged moving guards. They have been designed to be fitted to the hinged axis of machine guard doors and provide a robust hinge function in addition to interlock position sensing. Enclosures are protected to IP67 / IP69K with a low profile, hygienic design for washdown. The HS-Z hinge switches must be used in combination with a dual channel safety control device e.g. Safety Relay or Safety Controller. They can provide protection to Ple/Cat.4 to ISO 13849-1, and will maintain Ple with other Idem Z-type switches connected in series due to internal test functions of the switches. In addition, each switch provides input, output and guard state LED's. It is recommended to limit the number of switches connected in series to a maximum of 30.

**Operation:**
Operation is achieved by the rotating action of an enclosed cam profile and sensing components within the switch. The hinge switch can be adjusted upon installation to provide guard-open output signal anywhere between 0 to 10 degrees. All HS-Z will be factory set to provide the guard open output signal at 3 degrees. Once set during installation the HS-Z is permanently pinned in order to provide a fully tamper-resistant switching point.

**Installation Guide:**
**Correct Mounting of Interlock Switches is critical to obtain optimum performance and ensure safety reliability.**
**Installation of all switches must be in accordance with a risk assessment for the individual application. Installation must only be carried out by competent personnel and in accordance with these instructions.**

1. **All Hinge Switch Z are factory set to a switching point of 3 degrees. Check whether factory set switching point is suitable before carrying out any adjustment. Adjust only if required.**
2. **IMPORTANT: AFTER INSTALLATION THE USER MUST DRILL AND PIN THE FINAL SETTING POINT OF THE HINGE. Please follow the steps outlined in Fig. 1.**
3. Never use the switch as a mechanical stop.
4. The hinge switch can be mounted in any orientation depending upon the opening direction of the guard.
5. The hinge switch can be supplied in left and right-handed variants, and can be mounted with the connector either in the top or bottom orientation.
6. Check that the machine is stopped and cannot be started when the interlocked guard is open.
7. After installation apply tamper resistance paint or compound to the hinge (or bracket) mounting bolts.
8. All mounting hardware is supplied by the user. Fasteners must be of sufficient strength to guard against breakage or loosening of the hinge and guard.
9. Mounting holes on the rear of the switch accept M5 screws, the mounting slots on the front of the optional fixing bracket accept M6 screws (see dimensional drawings and specification page 2).
10. Excessive force must not be exerted by the weight and swing of the guard door (see limits in specification page 2).
11. If hinges are used in pairs for larger guard doors (or with a separately supplied Idem Blank Hinge) the hinges must be mounted co-axially. This can typically be ensured by mounting onto the same flat profile, and using a flat edge to ensure the hinges are parallel and aligned either vertically or horizontally (depending on installation orientation).
12. After mounting of the hinge(s) check the rotation and swing of the guard for misalignment and potential binding.
13. The use of a safety relay or controller is required for monitoring HS-Z switches.
14. These devices monitor 2 redundant circuits as per ISO13849-1 for up to Ple / Category 4 protection.

**WARNING: INSTALLER MUST DRILL AND PIN SWITCH IN FINAL SWITCHING POSITION. INSTALLER MUST NOT RELY ONLY ON ADJUSTMENT GRUB SCREW FOR SAFETY.**

**AVERTISSEMENT: L'INSTALLATEUR DOIT PERCER, ET PIN EN POSITION COMMUTATION FINALE. L'INSTALLATEUR NE DOIT PAS SE BASER SUR LA VIS DE RÉGLAGE POUR PLUS DE SÉCURITÉ.**

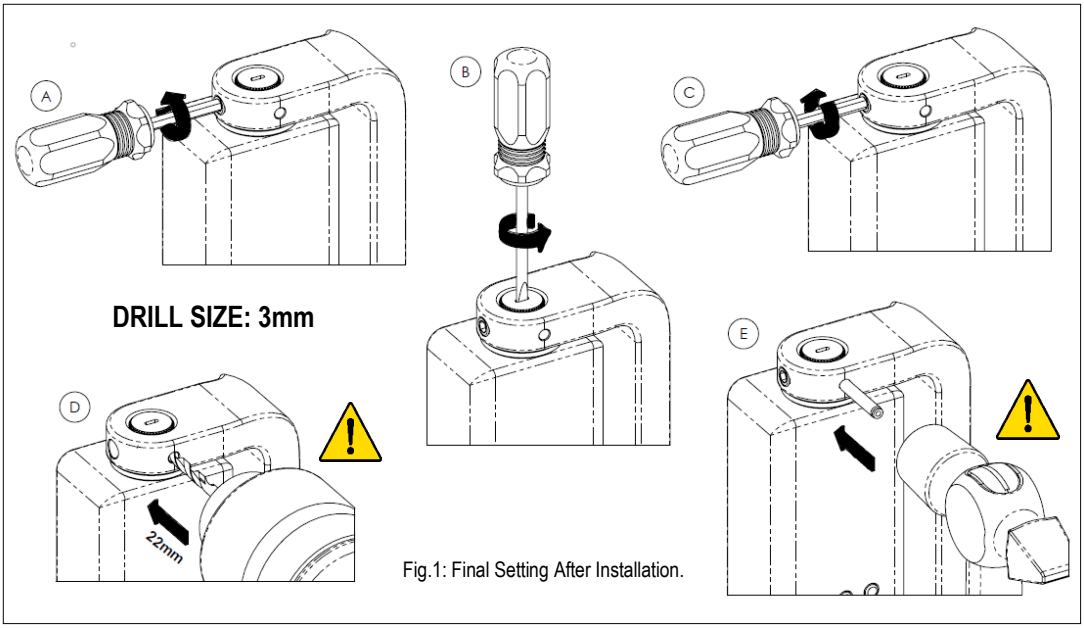
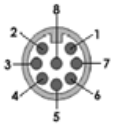



Fig.1: Final Setting After Installation.

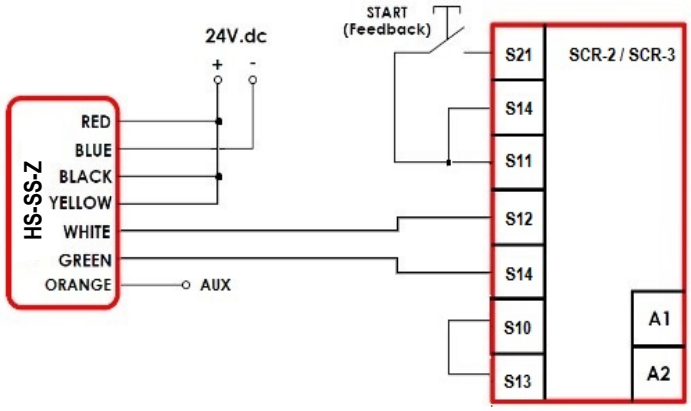
**IMPORTANT:** Do not use the hinge switch as an end stop. The hinge will rotate freely through 360 degrees. If the operating angle needs to be limited, this must be done so through a separate outer end stop within the guard.

**IMPORTANT:** The safety functions and mechanics must be tested regularly. For applications were infrequent guard access is foreseeable, the system must have a manual function test to detect a possible accumulation of faults. At least once per month for PLe Cat3/4 or once per year for PLd Cat3 (ISO13849-1). Where possible it is recommended that the control system of the machine demands and monitors these tests, and stops or prevents the machine from starting if the test is not done. (See ISO14119).

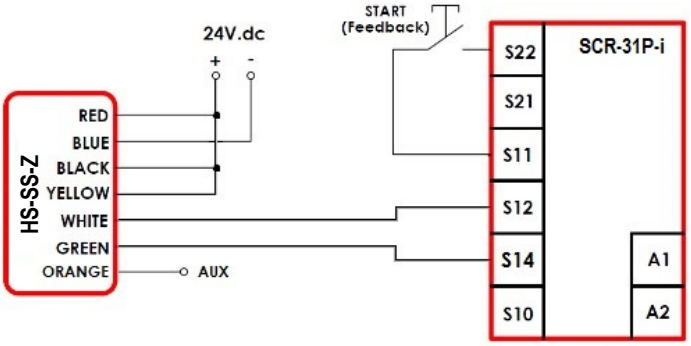
| M12 QC 8-Way (Pin view from Switch) | | Flying Lead Colours | Circuit |
|---|---|---|---|
|  | 8 | Orange | Auxiliary Signal Output (+24 Vdc) |
| | 5 | Brown | Not used |
| | 4 | Yellow | Safety Input 1 |
| | 6 | Green | Safety Output 1 |
| | 7 | Black | Safety Input 2 |
| | 1 | White | Safety Output 2 |
| | 2 | Red | Supply +24 Vdc |
| | 3 | Blue | Supply 0 Vdc |

**Maintenance:**
**Every Month:**
1. Check the switch body for signs of mechanical damage and wear.
2. Replace any switch showing damage.
3. Check that the machine is stopped and cannot be started when the interlocked guard is open.
4. Check each switch function individually by opening and closing each guard and ensuring that the appropriate LEDs on the safety relay or controller are illuminated when the switch is open.
5. Check for signs of moisture ingress.
6. Never attempt to repair any switch.

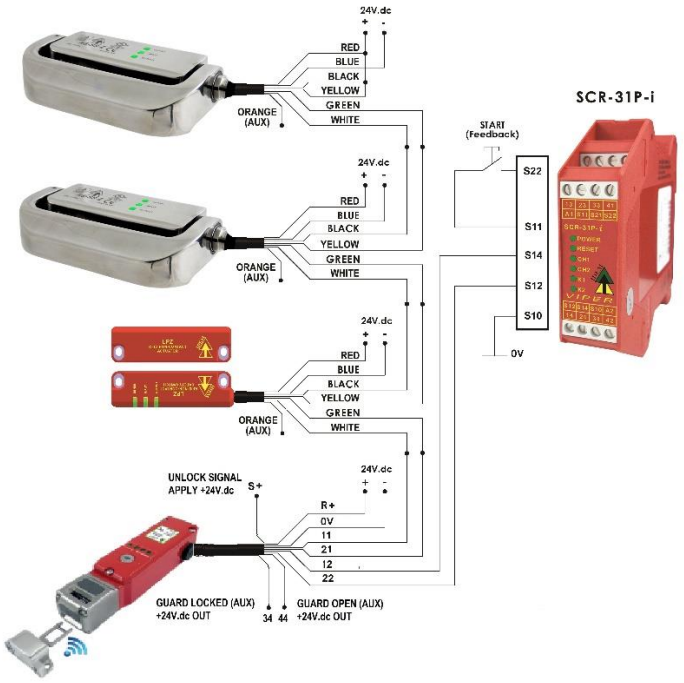
**Single Switch to SCR-2 or SCR-3 Safety Relay**




**Single Switch to SCR-31P-I Safety Relay (Viper Series)**




**Multiple Hinge Switches To SCR-31P-I Safety Relay (Viper Series)**




**LED Diagnostics**

| **GUARD LED:** | |
|---|---|
| Guard Closed | Green (Steady) |
| Guard Open | Red (Steady) |

| **INPUT LED:** | |
|---|---|
| Safety Inputs On | Green (Steady) |
| Safety Input Missing | Green (Flash) |
| Safety Inputs Off | Off |
| Internal Fault | Red (Steady) |

| **OUTPUT LED:** | |
|---|---|
| **Safety Inputs On** | **Green (Steady)** |
| Safety Outputs Missing | Green (Flash) |
| External Fault | Red (Flash) |

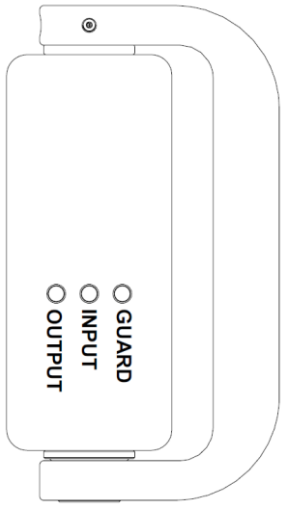



Fig.2: LED Arrangement Diagram

| **Standards:** | | |
|---|---|---|
| ISO 14119, IEC 60947-5-1, EN60204-1, ISO 13849-1, EN62061, UL508 | | |
| **Technical Data:** | | |
| **Rated Operating Voltage** | 24 Vdc -15% +10% | Use SELV/PELV |
| **Power Consumption** | 0.7 W | |
| **Outputs Rated Voltage** | 24 Vdc | |
| **Outputs Max. Current** | 0.2 A | |
| **Outputs Min. Current** | 1 mA | |
| **Outputs Type** | PNP | |
| **Inputs Rated Voltage** | 24 Vdc | |
| **Inputs Rated Current** | 2 mA | |
| **Auxiliary Signalling Output Rated Voltage** | 24 Vdc | |
| **Auxiliary Signalling Output Max. Current** | 0.2 A | |
| **Signalling Output Type** | PNP | |
| **Assured Switching Angles** | Off | 10 Degrees |
| **Typical Switching Angles** | Off | 0 – 10 Degrees (Adjustable) |
| **Response Time Guard Open** | 60ms max. | |
| **Response Time Inputs Off** | 20ms max. | |
| **Operating Temperature** | -20 / 55C | |
| **Storage Temperature** | -25 / 80C | |
| **Dielectric Withstand** | 250V.ac | |
| **Insulation Resistance** | 100 Mohms | |
| **Enclosure Protection** | IP67 / IP69K | |
| **Operating Temperature** | -25C +80C | |
| **Vibration** | IEC 68-2-6 10-55Hz+1Hz<br>Excursion: 0.35mm, 1 octave/min | |
| **Conduit Entry** | Various (see sales part numbers) | |
| **Fixing** | 7 x M5 | |
| **Mounting Position** | Any | |
| **Pollution Degree** | 3 | |
| **Short Circuit Overload Protection** | Fuse externally 10A (FF) | |

| **Characteristic Data according to IEC62061 (used as a sub system)** | | |
|---|---|---|
| **Safety Integrity Level** | SIL3 | |
| **PFH (1/h)** | 1.0 E-09 | Corresponds to 1% of SIL3 |
| **PFD** | 8.7 E-05 | Corresponds to 9% of SIL3 |
| **Proof Test Interval $T_1$** | 20a | |
| **Characteristic Data according to EN ISO13849-1** | | |
| **Performance Level** | e | |
| **Category** | 4 | |
| **$MTTF_d$** | 771a | |
| **Diagnostic Coverage DC** | High | |

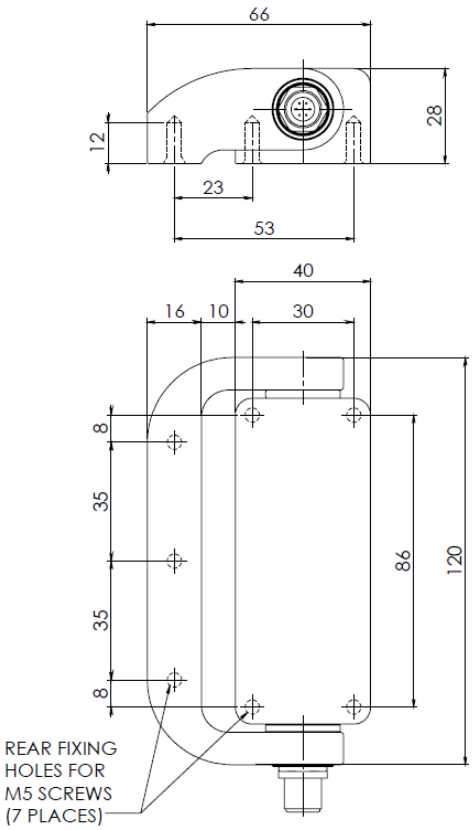
**Information with regard to UL 508:**

Type 1 Enclosures.
Maximum temperature 45ºC. Maximum output 24V.dc 100mA.
Powered *by Class* 2 or equivalent.

**WARNING: DO NOT DEFEAT, TAMPER, OR BYPASS THE SAFETY FUNCTION. FAILURE TO DO SO CAN RESULT IN DEATH OR SERIOUS INJURY.**

**AVERTISSMENT: NE PAS DESACTIVER, MODIFIER, RETIRER, OU CONTOURNER CETI INTERVERROUILLAGE IL PEUT EN RESULTER DES BLESSURES GRAVES DU PERSONNEL UTILISATEUR.**

**Switch Dimensions (mm)**




**WARNING: DO NOT EXCEED RECOMMENDED WORKING LOADS (SEE FIG. 3). MEDIUM OR LARGE SIZED GUARD DOORS ARE TO BE SUPPORTED USING THE HINGE SWITCH, USE OF SECONDARY HINGE SWITCH, OR BLANK HINGES SHOULD BE CONSIDERED BY THE INSTALLER (SEE FIG. 4).**

**AVERTISSEMENT: NE DÉPASSEZ PAS LES CHARGES DE TRAVAIL RECOMMANDÉES (VOIR FIG. 3). L'INSTALLATEUR DOIT PRENDRE EN CHARGE LES PORTES DE PROTECTION DE TAILLE MOYENNE OU GRANDE À L'AIDE DE L'INTERRUPTEUR DE CHARNIÈRE, DE L'INTERRUPTEUR DE CHARNIÈRE SECONDAIRE OU DE CHARNIÈRES VIERGES (VOIR FIG. 4).**

$$F_A = 800N \quad F_R = 800N$$

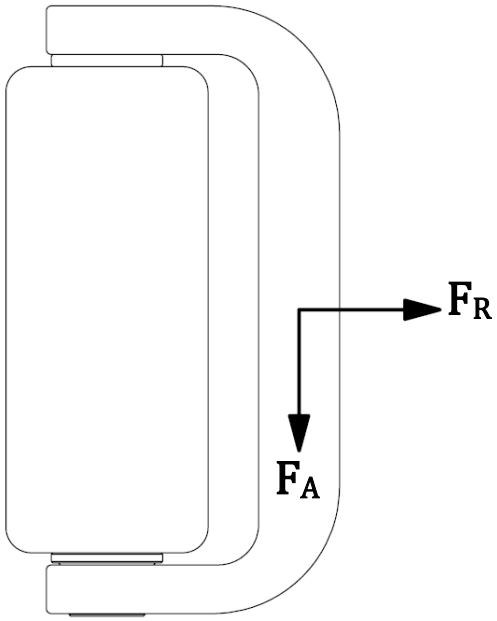
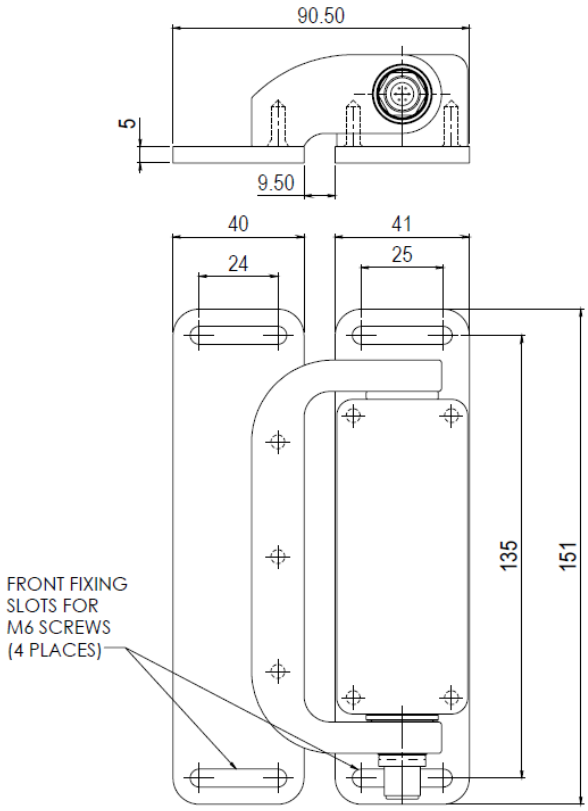



Fig.3: Recommended Working Load Diagram

**Fixing Bracket Dimensions (mm)**



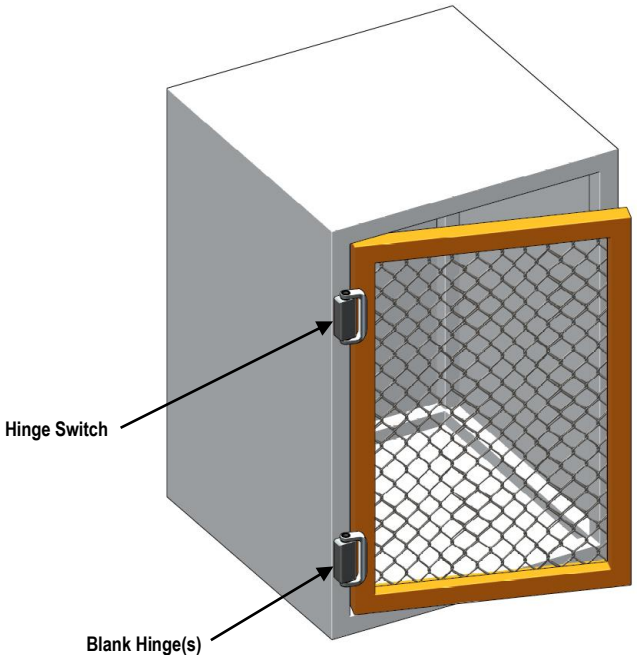




Fig.4: Typical Hinge Arrangement

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