

Operating Instructions: Hygienic Guard Lock



Description

Fortress' HGL is a Hygienic Guard Lock that is a compact and ultra-robust RFID high coded solenoid interlocking device. As typical with products from Fortress, HGL is externally approved and is suitable for applications up to PLe (Cat. 4). The stainless-steel housing and high retention force make this suited for heavier industry applications where washdown procedures are necessary.

High misalignment in the self-centering actuator covers any movement and inaccuracy in hinged and sliding door machine guarding. Additionally, the units' head element has an open design manufactured in stainless steel to allow for easy cleanability.

Available in multiple hardware variants, the device can be configured for applications where hazards persist after machinery is powered off. Multiple units can also be connected with OSSD (Output Signal Switching Device) functionality preventing fault masking. The large LED lens at the base provides clear state indication from all angles and at a distance.



Hygienic Design and 3-A RPSCQC Authorisation



No.
CERTIFICATE 68

The HGL Hygienic Guard Lock has been specifically designed for use in environments and applications where regular wash down occurs and where hygiene and good sanitation are particularly critical. The HGL and the accompanying HGL-HM Hygienic Mounting kit are designed to minimise unnecessary voids and apertures and also to limit all areas of metal to metal contact. Where apertures and voids do exist, such as for the locking head portion of the HGL, a simple open design allows for maximum cleaning access and inspection visibility.

The HGL and HGL-HM kit have been Third Party Verified against all relevant sanitary (hygienic) requirements for design, materials and fabrication of ANSI/3-A 00-01-2018 and are authorised as part of the 3-A Replacement Parts and System Component Qualification Certificate (RPSCQC) Program.

Important:

Fortress' Hygienic Guard Interlock is designed for use according to the installation and operating instructions enclosed. It must be installed by competent and qualified personnel who have read and understood the whole of this document prior to commencing installation. If the device or guarded machinery equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired. Any modification to or deviation from these instructions invalidates all warranties.

Fortress Interlocks Ltd accepts no liability whatsoever for any situation arising from misuse or misapplication of the device. The device is not to be used as a mains isolator or emergency stop. The device is a component to be added to a permanent electrical installation meeting the requirements of the applicable IEC/ EN standards.

All the voltages used within the connected circuits must be derived from a safety extra low voltage or protected extra low voltage power supply (SELV or PELV). The device meets the requirements of the standard EN ISO 14119 – Safety of machinery, interlocking devices associated with guards. Principles for design and selection. The device contains a single electrical circuit; all inputs, outputs and power supply have a common voltage reference, 0V.

DO NOT LEAVE AUXILIARY RELEASE / OVERRIDE DRIVER BIT IN PLACE!

Access to the auxiliary release driver bit must be securely controlled as they could make it possible to bypass the safety devices and allow access to areas that may have a residual hazard or may result in incorrect operation of some devices.

BEWARE OF INTENTIONAL MISUSE CAUSED BY OPERATORS WANTING TO BYPASS SAFETY SYSTEMS.

THE INSTALLER SHOULD ASSESS THE RISKS AND MITIGATE AGAINST THEM.

The installation and operation of the device and the complete machine guarding application must take into account the requirements of EN ISO 14119, in particular Section 7 - Design for minimising defeat possibilities. In order to maintain device safety rating, overall system must be validated to BS EN ISO 13849-2 and/or evaluated in accordance with BS EN 62061.

IF YOU HAVE ANY QUESTIONS OR QUERIES OF ANY NATURE WHATSOEVER PLEASE CONTACT THE SUPPLIER WHO WILL BE PLEASED TO ADVISE AND ASSIST.

Operating Instructions: Hygienic Guard Lock

Power-to-Unlock Safety-on-Guard-Locking (SOGL)	Power-to-Unlock Safety-on-Guard (SOG)	Power-to-Lock Safety-on-Guard (SOG)
The recommended set up for most machine guarding applications and ideal for machines with run-down times. Unit unlocks when power supplied. Safety circuits change state when unit locks or unlocks.	Popular configuration for where the solenoid performs a process control function rather than a safety function. Unit unlocks when power supplied. Safety circuits change state when actuator is engaged or removed.	When power is supplied to the solenoid the unit becomes locked. Allows for faster access and exit in the event of a power failure or power off event. Safety circuits change state when actuator is engaged or removed.

Solenoid Locking Type	Switch Configuration	M12 Connector Types	Part No.
Power-to-Unlock	Safety-on-Guard-Locking (SOGL)	Single 5 Pin M12	HGL-100A1-A
Power-to-Unlock	Safety-on-Guard-Locking (SOGL)	2 x 5 Pin M12 in 'Daisy-Chain' configuration	HGL-100A2-A
Power-to-Unlock	Safety-on-Guard-Locking (SOGL)	Single 8 Pin M12	HGL-100A3-A
Power-to-Unlock	Safety-on-Guard-Locking (SOGL)	2 x 5 Pin M12	HGL-100A4-A
Power-to-Unlock	Safety-on-Guard (SOG)	Single 5 Pin M12	HGL-110A1-A
Power-to-Unlock	Safety-on-Guard (SOG)	2 x 5 Pin M12 in 'Daisy-Chain' configuration	HGL-110A2-A
Power-to-Unlock	Safety-on-Guard (SOG)	Single 8 Pin M12	HGL-110A3-A
Power-to-Unlock	Safety-on-Guard (SOG)	2 x 5 Pin M12	HGL-110A4-A
Power-to-Lock	Safety-on-Guard (SOG)	Single 5 Pin M12	HGL-610A1-A
Power-to-Lock	Safety-on-Guard (SOG)	2 x 5 Pin M12 in 'Daisy-Chain' configuration	HGL-610A2-A
Power-to-Lock	Safety-on-Guard (SOG)	Single 8 Pin M12	HGL-610A3-A
Power-to-Lock	Safety-on-Guard (SOG)	2 x 5 Pin M12	HGL-610A4-A
Description			Part No.
Hygienic Mounting Kit			HGL-HM

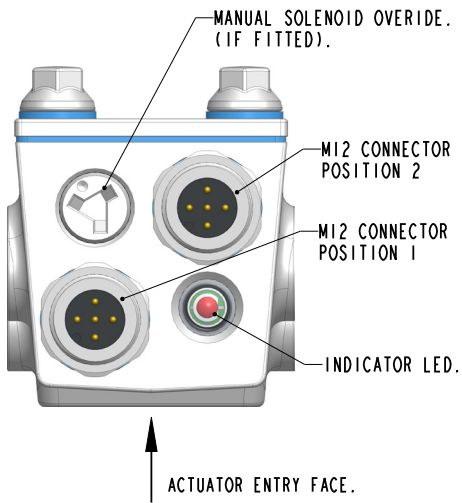
General Data	Product Type		
	Power-to-Unlock, Safety-on-Guard- Locking	Power-to-Unlock, Safety-on-Guard	Power-to-Lock, Safety-on-Guard
Housing Materials	316 Stainless Steel and CF8M Stainless Steel Casting(s)		
Plastic Materials	FDA Food Contact Compliant PBT and UL 94V-2 Polycarbonate		
Seal Materials	FDA Food Contact Compliant Silicon Rubber (ref. 21 CFR 177-2600)		
Mechanical Life	1,000,000 Operations		
Holding Force F	5 kN	8 kN	8 kN
Holding Force F_{zh}	6 kN	9.2 kN	9.2 kN
Maximum Holding Force, F_{1max}	12 kN	12 kN	12 kN
Minimum Actuating Radius	150 mm		
Maximum Actuating Frequency	720 Operations per Hour		

Operating Instructions: Hygienic Guard Lock

Environmental Data	
Ingress Protection	IP65, IP67 and IP69
Environment Type	Indoor
Operational Pollution Degree (IEC 664)	2
Ambient Temperature	-20°C * to +55°C (-4°F to +131°F)
*Note, the unit will only continue to work below freezing point (0°C) where it can be guaranteed that ice will not form on or in the device as it could cause the mechanical parts to bind and jam.	
Maximum Relative Humidity	50% @ 70°C
Maximum Altitude	2000m
Vibration	Tested in accordance with GS-ET-19 and BS EN 60947-5-2
Electrical Data	
Operating Voltage, U_e	24V DC (+/- 10%)
Rated Insulation Voltage, U_i	60V
Rated Impulse Withstand Voltage, U_{imp}	500V
Voltage Drop, U_d	<3.5V
Rated Operating Currents	400mA
Minimum Operational Current	100mA
Off-State Current	<0.5mA
Rated Conditional Short-circuit Current	100 A
Overvoltage Category	Type 2
Electromagnetic Compatibility (EMC)	Conforms to BS EN 60947-5-3
RFID Sensor Data (as defined in EN 60947-5-2)	
Coding Type (as per BS EN ISO 14119)	High
Safety Output Timing Data	
Safety Response Time	<200ms
Safety Input Low to Safety Output Low	<25ms
Gate Open to Safety Output Low (SOG)	<200ms
Unit unlocked to Safety Output Low	<200ms

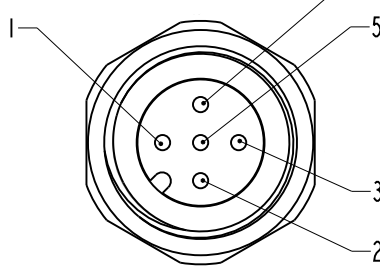
Figure 1: HGL Wiring and Connection Information -

HGL CONNECTOR POSITIONS



SINGLE 5 PIN M12 CONNECTOR

HGL-100A1-A
HGL-110A1-A
HGL-610A1-A

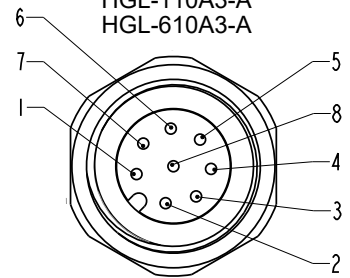


CONNECTOR 1
M12 MALE THREADED

		SIGNAL
CONNECTOR 1 M12 MALE	PIN 1	24V
	PIN 2	OUTPUT 1
	PIN 3	0V
	PIN 4	OUTPUT 2
	PIN 5	SOLENOID DRIVE

SINGLE 8 PIN M12 CONNECTOR

HGL-100A3-A
HGL-110A3-A
HGL-610A3-A

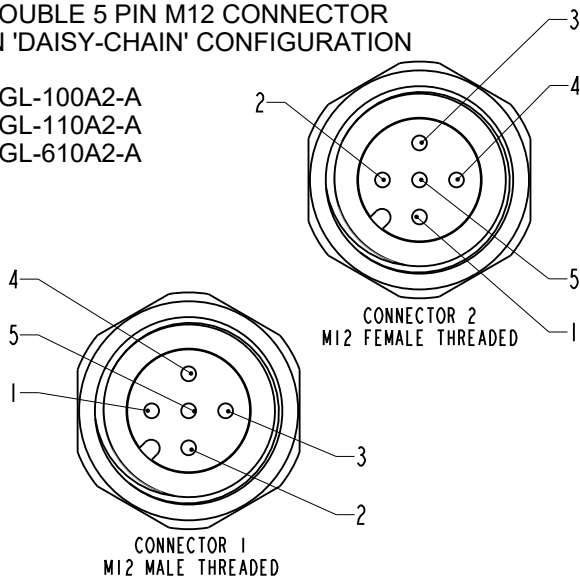


CONNECTOR 1
M12 MALE THREADED

		SIGNAL
CONNECTOR 1 M12 MALE	PIN 1	INPUT 2
	PIN 2	24V
	PIN 3	OUTPUT 1
	PIN 4	OUTPUT 2
	PIN 5	MONITOR
	PIN 6	INPUT 1
	PIN 7	0V
	PIN 8	SOLENOID DRIVE

DOUBLE 5 PIN M12 CONNECTOR IN 'DAISY-CHAIN' CONFIGURATION

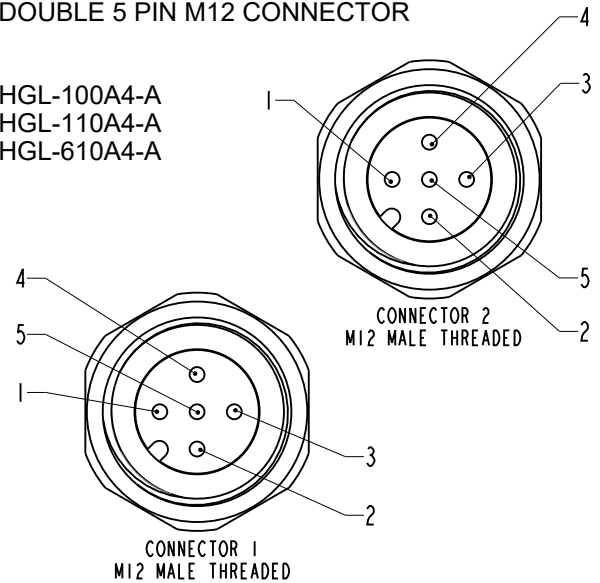
HGL-100A2-A
HGL-110A2-A
HGL-610A2-A



		SIGNAL
CONNECTOR 1 M12 MALE	PIN 1	24V
	PIN 2	OUTPUT 1
	PIN 3	0V
	PIN 4	OUTPUT 2
	PIN 5	SOLENOID DRIVE
		SIGNAL
CONNECTOR 2 M12 FEMALE	PIN 1	24V
	PIN 2	INPUT 1
	PIN 3	0V
	PIN 4	INPUT 2
	PIN 5	SOLENOID DRIVE

DOUBLE 5 PIN M12 CONNECTOR

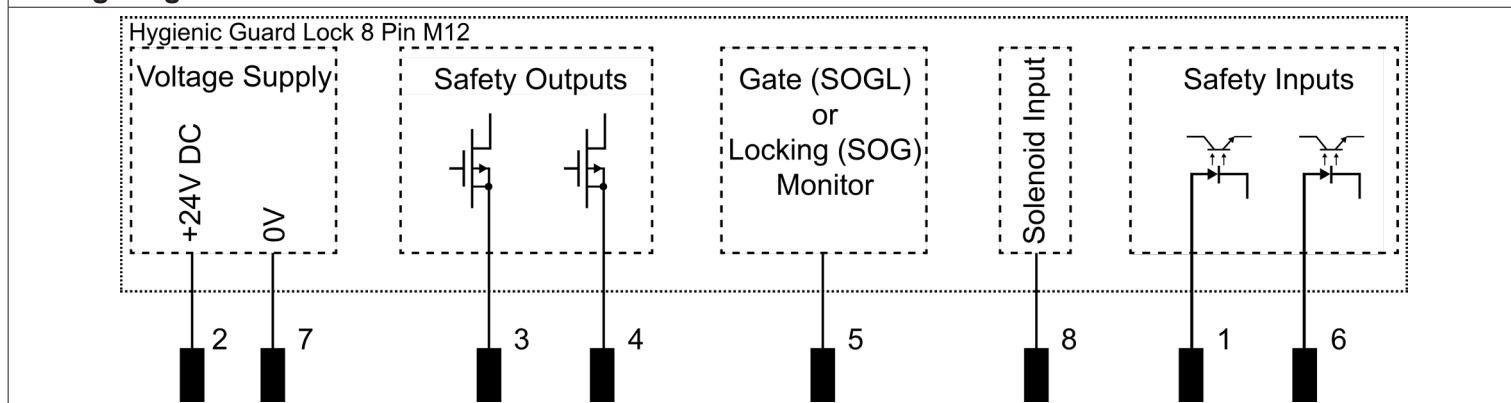
HGL-100A4-A
HGL-110A4-A
HGL-610A4-A



		SIGNAL
CONNECTOR 1 M12 MALE	PIN 1	24V
	PIN 2	OUTPUT 1
	PIN 3	0V
	PIN 4	OUTPUT 2
	PIN 5	
		SIGNAL
CONNECTOR 2 M12 MALE	PIN 1	
	PIN 2	
	PIN 3	0V
	PIN 4	SOLENOID DRIVE
	PIN 5	

Operating Instructions: Hygienic Guard Lock

Wiring Diagram



Two Safety Outputs

Dual channel OSSD outputs with “low” voltage to indicate the safe state.

Must be connected to the next OSSD Device or an external evaluation device.

The external evaluation device must:

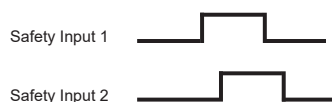
- Monitor both signals are high before it can leave its safe state
- Monitor that both signals are synchronous
- Have a diagnostic coverage of at least 99%

Two Safety Inputs

Dual channel safety inputs with “low” voltage to indicate the safe state.

Must be connected to the previous OSSD device or 24V. A fault will be detected if the inputs are not synchronous (see timing fault diagram). A full input cycle is needed to clear the fault.

[Safety Inputs Timing Faults](#)



Solenoid Drive Input

Solenoid drive input with “high” voltage to activate the solenoid.

For Power-to-unlock (PTU) devices the solenoid will unlock the unit.

For Power-to-lock (PTL) devices the solenoid will lock the unit.

For Safety-on-Guard-Locking (SOGL) devices the input must be driven from a safe and monitored source to be able to achieve PLe.

Monitor Output

Control output with “high” voltage to indicate active condition. For Safety-on-Guard-Locking (SOGL) devices the monitor is activated when the gate is opened.

For Safety-on-Guard (SOG) units the monitor is activated when the unit is unlocked.

Daisy Chain Information

The number of units that can be wired in series depends on two main criteria:

1. Power line voltage drop
2. Total safety response time

Voltage Drop

Each unit in series draws current and causes a voltage drop on the power line.

The greater the number of units + distance, the greater the voltage drop.

The voltage requirement is 24+10%-15%, this means the voltage must not drop below 20.4V to ensure correct operation.

A typical application with units spaced 5m apart, wired with 22 AWG cable would allow for 4 units in series. For more detailed calculation please see the Voltage Drop Tool on the Fortress website.

The maximum number of units permitted in series is 8.

Safety Response Time

Each unit in series will increase the total safety response time of the line.

The maximum safety response time for one unit is 200ms.

The increase response time per additional unit is 25ms.

The total response time can be calculated using:

$T = 200\text{ms} + (n-1) \times 25\text{ms}$, where n = the number of units in the line

Operating Instructions: Hygienic Guard Lock

Safety Data		Product Type		
		Power-to-Unlock, Safety-on-Guard- Locking	Power-to-Unlock, Safety-on-Guard	Power-to-Lock, Safety-on-Guard
Safety Function 1	Monitor Safety Inputs are High	√	√	√
Safety Function 2	Monitor door is closed	√	√	√
Safety Function 3	Keep the door locked	√		
Safe State 1	1 OSSD output is low	√	√	√
Safe State 2	Door is Locked	√		
Performance Level (EN ISO 13849-1:2015)		Up to PLe		
Category (EN ISO 13849-1:2015)		Up to Cat.4		
SIL (according to IEC 62061)		Up to SIL 3		
Diagnostic Coverage		A maximum DC of 99% can be achieved with suitable monitoring.		
PFH		4.16x10-9		
Device Type (according to ISO 14119)		Type 2	Type 4 with Lock	Type 4 with Lock
Demand mode (according to 62061)		High		
Applicable Standards		ISO 14119 , EN ISO 13849 , IEC 61508 , EN 60947-5-2, BS EN 62061		

Functioning
Power-to-Unlock Solenoid Type
Closing and Locking The device is closed by inserting the actuator assembly into the upper head portion of the switch assembly. Once inserted, the internal mechanism then locks the actuator assembly into the switch placing the device into its locked-state.
Unlocking The device is unlocked when voltage is applied to the solenoid drive pin.
Opening Once unlocked, the actuator can be removed from the assembly.
Auxiliary Release Function In the event of power failure, the device can be released and unlocked using the supplied auxiliary release driver bit irrespective of the state of the solenoid. <ul style="list-style-type: none"> • Use the auxiliary release driver bit (with an appropriate screwdriver) to drive and rotate the override spindle 90° clockwise. • Remove the actuator from the switch. • Rotate the override spindle 90° anti-clockwise back to its 'locked' position and restore any necessary protection. Note; Auxiliary release driver bit must be securely controlled during normal operation to prevent misuse.
Power-to-Lock Solenoid Type
Closing The device is closed by inserting the actuator assembly into the upper head portion of the switch assembly. Note, in all Power-to-Lock solenoid type devices the device will remain in its unlocked-state until the solenoid is energised.
Locking The device is locked when voltage is applied to the solenoid drive pin.
Unlocking The device is unlocked when voltage is removed from the solenoid drive pin.
Opening Once unlocked, the actuator can be removed from the switch.
There is no auxiliary release function on a Power-to-Lock solenoid type device.

Figure 2: HGL Actuator and Switch assemblies

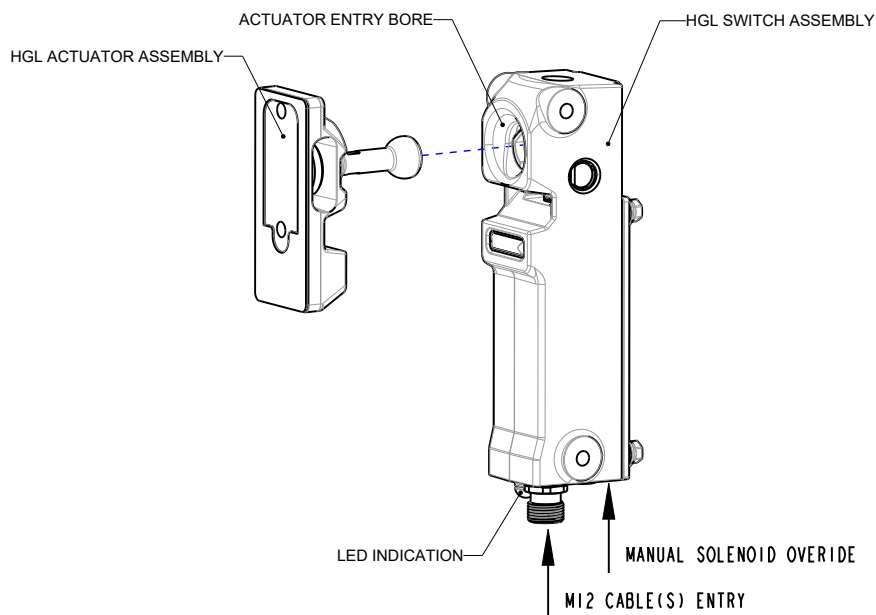
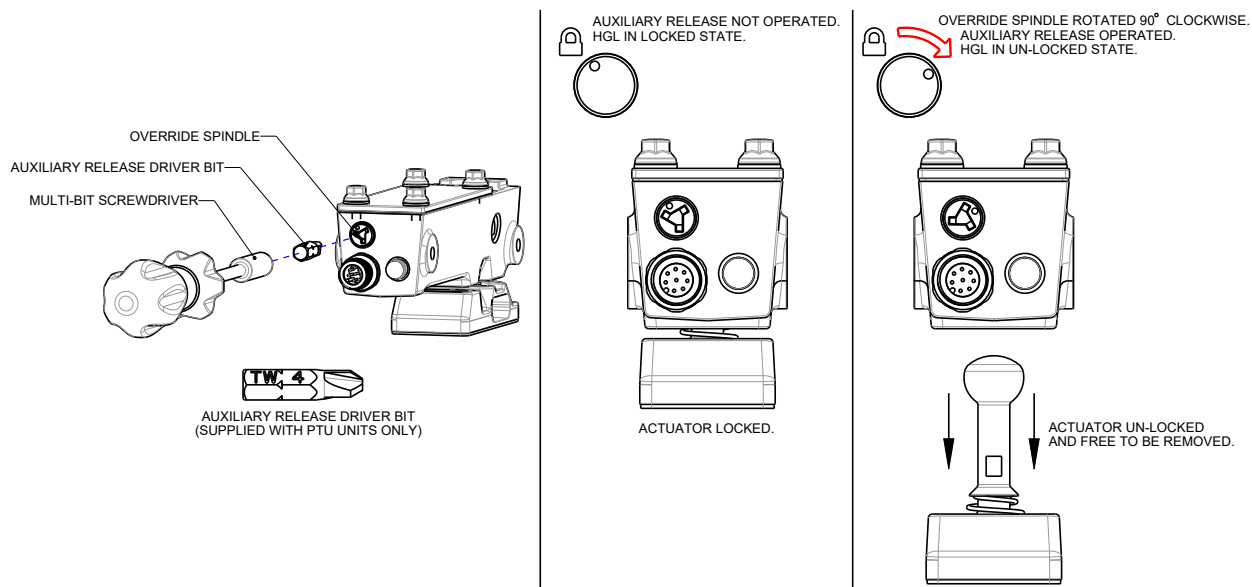


Figure 3: Auxiliary Release Function



LED Output

Led Pattern	Status	Function
OFF	○	UNIT NOT POWERED
GREEN	●	HEAD IN-UNIT LOCKED
RED	●	HEAD OUT-UNIT UNLOCKED
1 RED FLASH	⚡	MANUAL OVERRIDE USED
AMBER	●	UNIT FAULT
1 AMBER FLASH	⚡	INPUT FAULT
2 AMBER FLASH	⚡ ⚡	OUTPUT FAULT
3 AMBER FLASH	⚡ ⚡ ⚡	WRONG RF ACTUATOR
GREEN RED ALT	● ●	HEAD IN UNIT UNLOCKED
GREEN OFF ALT	● ○	HEAD IN UNIT LOCKED INPUTS OFF
GREEN AMBER ALT	● ●	INCORRECT SUPPLY VOLTAGE
LONG AMBER + AMBER FLASH	● ⚡	INTERNAL FAULT CODE

Operating Instructions: Hygienic Guard Lock

Mounting Instructions
Tools and Fixings Required
<ul style="list-style-type: none">• 4 x M5 Screws for securing switch and actuator.• Screws must be suitable length for a minimum of 10mm thread engagement.• Screws must be security type to prevent unauthorised removal or tampering.• Screws must be of hygienic design and form so as not to compromise product cleaning and maintenance.• Recessed socket head bolts may only be used if; the HGL product is mounted away from any product contact source, they are shielded from any product residues and are mounted so that the socket heads are able to self-drain.• Required torque setting; 8-12 Nm.• 4 x M5 Nut / T-Nut / Threaded Hole for securing switch and actuator.• Driver suitable for securing M5 fixing screws.• Auxiliary release driver bit (provided) to operate auxiliary release function.• 1/4" Driver to suit auxiliary release driver bit.• Adhesive threadlocker to secure mounting fixings from loosening due to vibration. <p>Note: Threadlocker must be FDA compliant, non-toxic and must be suitable for the environment to which the HGL product is to be used.</p>
Mechanical Mounting Instructions
<ol style="list-style-type: none">1. Locate the device so that operation of the auxiliary release function, functional testing, electrical testing, scheduled inspection and maintenance and final unit replacement are all easily possible.2. Operate the auxiliary release function to remove the actuator from the switch assembly. Note, this step is not applicable to Power-to-Lock solenoid type devices.3. Mount the switch and actuator assemblies to appropriate parts of the machine or guarding (see Fig.4 for example mounting).<ul style="list-style-type: none">• The actuator must be correctly aligned and oriented with the switch as per the assembly dimensions.• All mounting surfaces should be flat, stable and suitable of providing a minimum of 10mm M5 thread engagement or sufficient support to either an M5 Nut or M5 T-Nut.• For mounting in certain hygienic applications additional gaskets and spacer posts maybe required to aid cleaning and remove risk of metal-to-metal joins. In these applications the HGL-HM Mounting Kit can be used, see HGL-HM specific instructions below for more details.• If mounting to a hollow section frame or post, the integrity of the frame shall not be compromised by drilling into the hollow interior. Welded studs or fully welded sleeves should then be used to the exterior of the hollow frame to maintain solid form and to not compromise frame sealing.4. Perform mechanical function tests before completing installation and commission. See mechanical function test section.
Mechanical Mounting Instructions with HGL-HM mounting Kit
<p>To aid hygienic mounting the optional HGL-HM Mounting Kit can be purchased. The HGL-HM Kit contains;</p> <ul style="list-style-type: none">• 2 x Spacers / Stand-offs to assemble Switch body away from mounting surface for increased cleaning access.• 4 x Gasket Washers to seal between Spacers/Stand-offs, Switch assembly and mounting surface.• 4 x M5 Gasket Washers to seal the through-hole fixing holes of the Actuator and Switch assemblies.• 1 x Adhesive backed Gasket for Actuator assembly to seal between Actuator and mounting surface. <p>To mount the complete HGL product with an HGL-HM mounting kit, follow steps 1 to 4 above and mount as per the examples given in Figures 5, 6 and 7.</p> <p>The Spacers / Stand-offs in the HGL-HM mounting kit allow for mounting the HGL Switch assembly with either M5 fixing screws into a threaded panel (as per Figure 6) or with M8 fixing screws through a pre-cut panel (as per Figure 7).</p> <p>Note: For maximum Head Retention force it is recommended to secure the HGL-HM mounting kit with M8 fixings as per Figure 7.</p>
<p>Mount the complete Device only in the correctly assembled condition.</p> <ul style="list-style-type: none">• The complete machine guarding installation must conform to all relevant design, construction and installation standards and guidelines.• Any gap around the perimeter of the machine and guarding when closed and locked (Safety Outputs High) must not exceed the limits specified in the relevant standards.• All fixing screws used to mount the complete device must be permanently prevented from removal. If mounting fixings are visible, they must be secured against removal by personnel using standard tools, manipulation and un-authorised or un-identifiable removal. If mounting fixings are not visible or hidden, they must be secured against removal or loosening due to vibration. In both cases, a middle strength adhesive threadlocker is required.• The complete device must not be used as a mechanical stop. Where applicable, precautions must be made to ensure the door or gate of any guarded area has sufficient support and stops to prevent the impact on the device.

Figure 4: Mounting Application Example

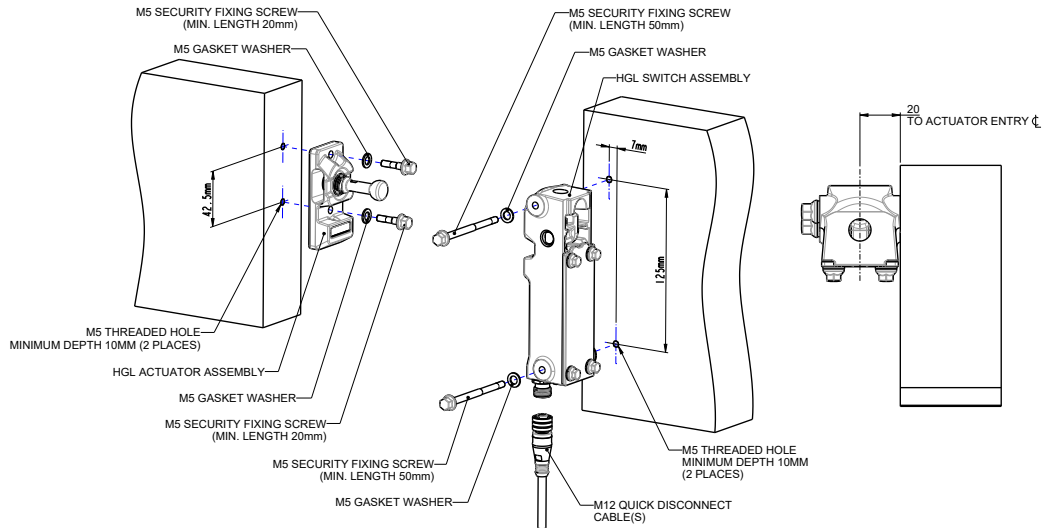


Figure 5: Actuator Mounting using HGL-HM mounting kit

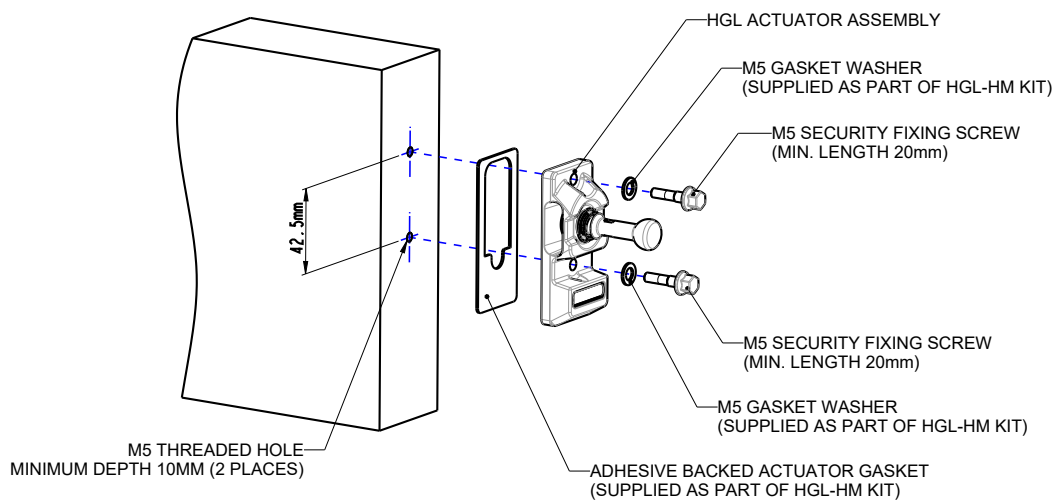


Figure 6: Switch Mounting using HGL-HM mounting kit and M5 threaded holes

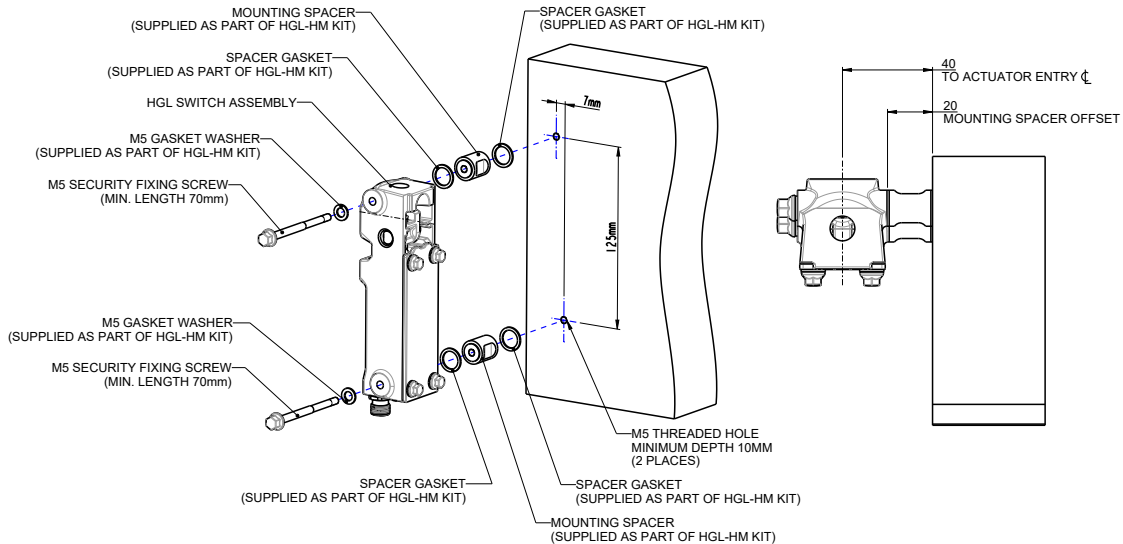
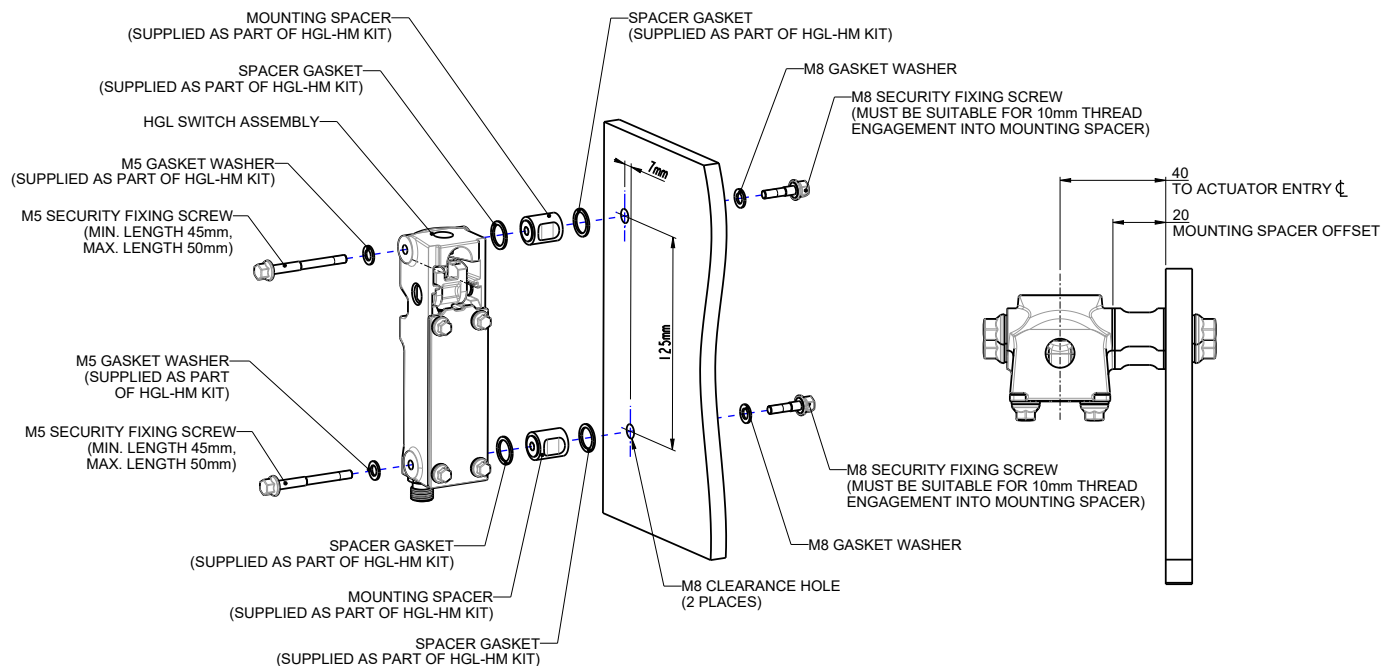


Figure 7: Switch Mounting using HGL-HM mounting kit and M8 through holes.



Electrical Connection Instructions

1. Make sure the electrical supply is isolated and safe before any installation.
2. Insert appropriate M12 connector cabling into base of HGL Enclosure assembly.
 - Note: Suitable connectors and cabling must be used to maintain IP67 and IP69 sealing.
 - Connectors and cabling design and materials must be FDA compliant, non-toxic and must be suitable for the environment to which the HGL product is to be used.
 - Exposed braided and armoured or jointed coverings on cables shall not be used.
3. Perform electrical function tests before completing installation and commission. See electrical function test section.
 - Ensure that all circuits connected to the device are derived from a safety extra low voltage or protected extra low voltage power supply (SELV or PELV).
 - Ensure the electrical connection and installation of the device and complete guarding application is performed according to all relevant local standards and guidelines.

Mechanical Function Test (Unpowered)

Power-to-Unlock HGL Interlocking Devices

1. Insert the actuator into the switch.
It must lock into position.
2. Operate the auxiliary release function and remove the actuator from the switch.
3. Return the override spindle to its locked position and reinsert the actuator into the switch.
It must lock into position.

Power-to-Lock HGL Interlocking Devices

1. Insert the actuator into the switch.
It must not lock into position.

Electrical Function Test (Powered)

1. Close the guard, ensure the device is in its locked-state.
It must not be possible to open the guard.
 - The safety outputs should be high. (Note: SOGL units change state upon guard being locked, SOG upon guard closed).
2. Switch off the machine, unlock the device and open the guard.
 - The safety outputs should be Low. (Note: SOGL units change state upon guard being locked, SOG upon guard closed).

Warning: This device does not contain the machine reset or restart facility after an escape or auxiliary release of the guard locking. Additional measures are required to achieve the reset of the machine system.

Operating Instructions: Hygienic Guard Lock

Service and Inspection

Regular weekly inspection of the following is necessary to ensure trouble-free, lasting operation:

- Secure mounting of components.
- Debris and wear.

If lubrication is required, ensure an appropriate food safe, non-toxic WD spray lubricant is used. Any lubricant must be NSF H1 registered or ISO 21469 certified. For example, Rocol Foodlube WD Penetrant Spray.

Note: Rocol Foodlube® Universal 2 Grease is used during HGL production.

The frequency of lubrication / cleaning will depend on the environment. **There are no user serviceable parts in a HGL product. If damage or wear is found, the whole module must be replaced.**

DRY LUBRICANT SHOULD NOT BE USED.

Cleaning Instructions

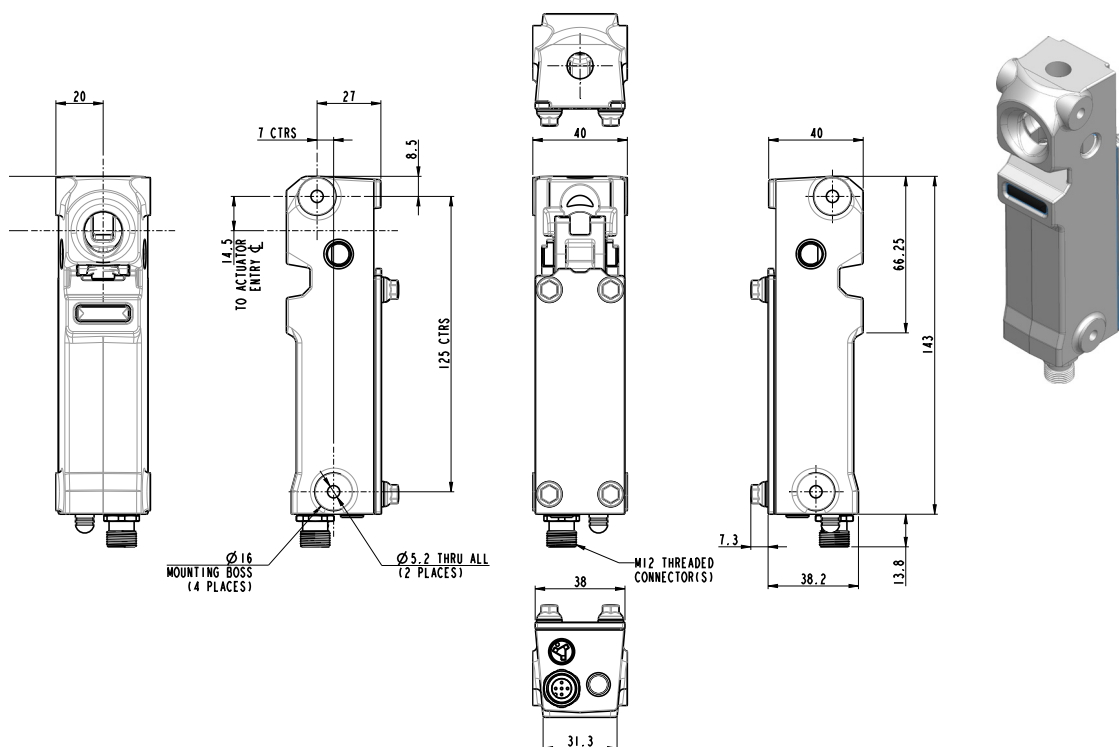
The HGL product is designed to suit a Manual Cleaning procedure which requires the removal of the Actuator assembly from the Switch assembly (see Auxiliary Release Function above for details of how to manually unlock and release the Actuator without power).

For best results it is recommended to clean the Switch assembly and Actuator separately. No further disassembly or dismantling of the HGL product is required. Any attempt to remove the lid or disassemble either the HGL Actuator assembly or Switch assembly will foul the HGL product sealing.

All cleaning processes must be performed with the HGL product de-energised and the electrical supply isolated.

Note: In order for IP67 and IP69 product sealing to be maintained, all electrical connectors and cabling must remain fully assembled.

Figure 8: Dimensional Drawing – HGL Switch Assembly



Operating Instructions: Hygienic Guard Lock

Figure 9: Dimensional Drawing – HGL Actuator Assembly

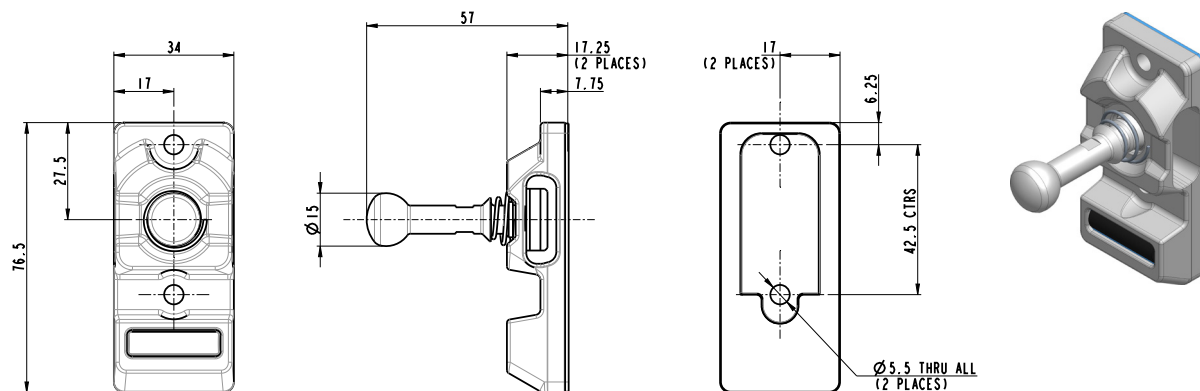
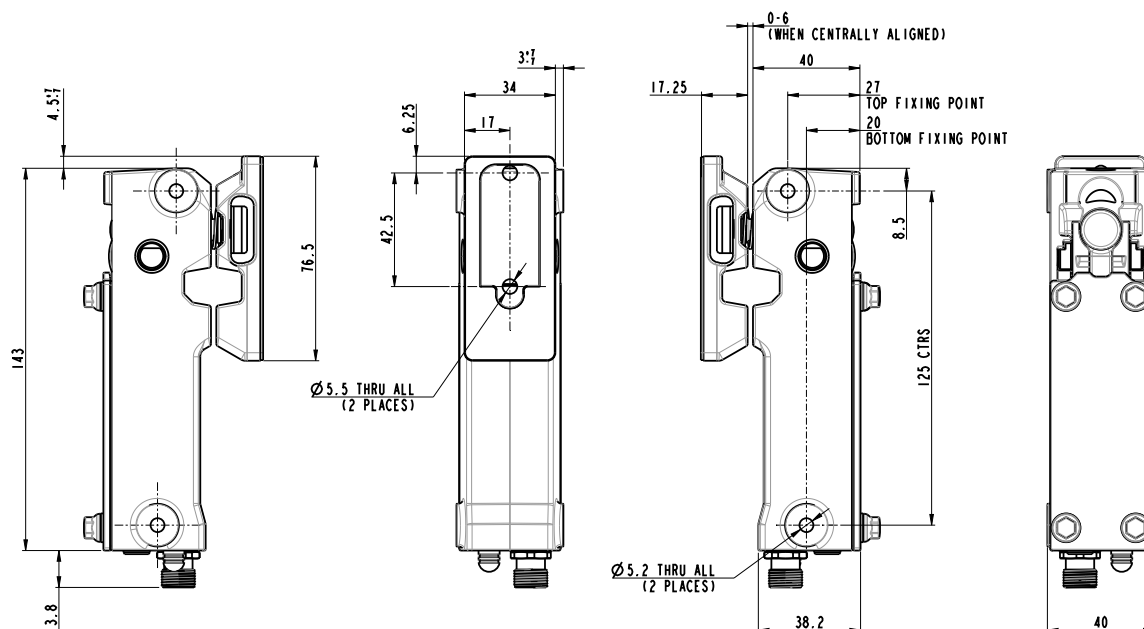


Figure 10: Dimensional Drawing – HGL Switch and Actuator Assembly



Disposal

The device does not contain any certified hazardous materials so should be disposed of as industrial waste.

Liability Coverage is Voided Under the Following Conditions:

- If these instructions are not followed.
- Non-compliance with safety regulations.
- Installation and electrical connection not performed by authorised personnel.
- Non-implementation of functional checks.

Protection Against Environmental Influences

In order to maintain full mechanical and electrical performance, the device must be protected against the ingress of all foreign bodies such as swarf, sand, blasting shot etc.

The device is not suited for use in corrosive environments.

The device is only suitable for dusty environments where careful consideration has been given to environment requirements, product selection and mounting positions. Contact your local Fortress channel partner for guidance and details. Where possible the device must be mounted away from the guarded machine or by the use of anti-vibration mountings in order to avoid the effects of vibration, shock and bump.

The manufacturer reserves the right to modify the design at any time and without notice.

This guide should be retained for future reference.