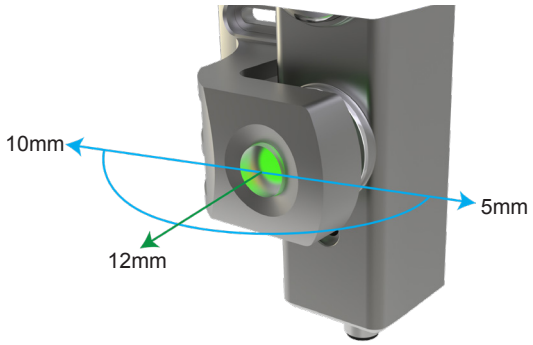
Operating Instructions: High Level Coded Element

Description

The High Level Coded (HLC) element for the tGard configurable access & control unit for machine guarding provides protection against defeat with a high misalignment tolerance on the actuator and provides safety outputs through OSSD or SSR configurations.

The tGard High Level Coded (HLC) element can also incorporate safety contacts from associated tGard elements.



Important:

The High Level Coded element 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 unit 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 Unit.
This device must not be used in applications requiring conditional guard locking with a required performance level of PLe.
The unit is not to be used as a Mains Isolator or Emergency Stop. The unit is a component to be added to a permanent electrical installation meeting the requirements of the applicable 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 contains a single electrical circuit; all inputs outputs and power supply have a common voltage reference, 0V.
The device meets the requirements of the standard BS EN ISO 14119:2013 – Safety of machinery, interlocking devices associated with guards - Principles for design and selection.
If a tGard Teach Token (TNX) is used during device installation, commissioning or otherwise, then it must be securely controlled and stored after use. Any misuse of a Teach Token could make it possible to bypass the function and safety of a system resulting in a hazardous situation.
Note: The tGard device can be taught new coded actuators via the use of a Teach Token. The user must have a system in place to manage and secure Teach Tokens.
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 unit and the complete machine guarding application must take into account the requirements of ISO 14119:2013, Clause-7 - Design to minimise defeat possibilities of interlocking devices.
In order to maintain unit safety rating, overall system must be validated to ISO 13849-2 and/or evaluated in accordance with IEC 62061.
IF YOU HAVE ANY QUESTIONS OR QUERIES OF ANY NATURE WHATSOEVER PLEASE CONTACT THE SUPPLIER WHO WILL BE PLEASED TO ADVISE AND ASSIST.

Technical Specification

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 CL3
Diagnostic Coverage	A maximum DC of 99% can be achieved with suitable monitoring
PFH_D	$4.16x10^{-9}$
Demand Mode (according to IEC 62061)	High
Applied Standards	BS EN ISO 13849-1:2015 BS EN ISO 13849-2:2012 BS EN ISO 14119:2013 UL 508/R:2013-10 CAN/CSA-C22.2 No.14-13:2013-03

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tGard High Level Coded Element Part Number Options				
Part No.	**Safety I/O Type**	**Safety Input from External OSSD Device**	**Guard Monitor Output**	**Wiring**
TNA*	SSR	No	Yes	Series
TNB*	OSSD	No	Yes	Series
TNC*	OSSD	Yes	Yes	Series
TNR	SSR	No	No	Series
TNS	OSSD	No	No	Series
TNT	OSSD	Yes	No	Series
* Should not be used when there is a head element.				

Safety Related Functions and Safe States		
Ref	**Unit Type**	
	OSSD	**SSR**
Function 1	Monitor safety inputs are high	
Function 2	Monitor guard is closed using RFID	Monitor guard is closed using RFID
Function 3	Monitor safety contacts from associated tGard elements, are closed	Monitor safety contacts from associated tGard elements, are closed
Safe State 1	One safety output is low	
Safe State 2		One safety circuit is open

Environmental Data	
Ingress Protection	IP65
Environment Type	Indoor
Operational Pollution Degree (IEC 664)	2
Ambient Temperature	-25°C to 40°C (-13°F to 104°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% at 70˚C
Maximum Altitude	2000m
Vibration	Tested in accordance with GS-ET-19 and BS EN 60947-5-2

Electrical Data	
Operating Voltage, $\mathbf{U_e}$	24V DC (+/- 10%)
Rated Insulation Voltage, $\mathbf{U_i}$	60V DC
Rated Impulse Withstand Voltage, $\mathbf{U_{imp}}$	500V DC
Voltage Drop, $\mathbf{U_d}$	<3.5V DC
Rated Operating Currents	100mA
Minimum Operational Current	50mA
Off-State Current	<0.5mA
Rated Conditional Short-circuit Current	100 A
Overvoltage Category	Type 2
Electromagnetic Compatibility (EMC)	Conforms to BS EN 60947-5-3:2013

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RFID Sensor Data	
Coding Type (as per ISO 14119)	High Level Coded
Safety Output Timing Data	
Safety Response Time	<200ms
Safety Input Low to Safety Output Low	<25ms
Guard open to Safety Output Low	<200ms
Unit unlocked to Safety Output Low	<200ms

LED Output			
LED Pattern		**Cause**	**Expected Action to Resolve**
OFF	○	No power supply	Check continuity from power supply to device
RED / GREEN	🔴🟢	RF actuator present, safety contacts from associated tGard elements are open (e.g. E-Stop pressed or solenoid unlocked)	Reset E-Stop, insert head or lock unit
RED	🔴	Guard open - RF actuator not present, safety contacts from associated tGard elements are open	-
GREEN	🟢	Guard closed along with safety contacts from associated tGard elements	-
GREEN / BLUE	🟢🔵	Guard closed along with safety contacts from associated tGard elements, reteach limit has been reached	Unit should be replaced before another reteach is needed
GREEN FLASH	☼	Safety input signal from previous device low	Check the safety state of the previous device, or continuity from the 24V supply if the first device in the chain
RED FLASH	☼	Incorrect actuator used	Use the correct actuator, or reteach a new actuator
QUICK BLUE FLASH	☼	Teach token presented, no re-teachings left	Contact your local Fortress Representative*
AMBER / GREEN	🟠🟢	On a OSSD configured device, a mismatch between 2 safety inputs from the external device is detached	Confirm continuity from the previous device on both safety inputs, then reset fault by cycling the safe state of the previous device
AMBER	🟠	Major Fault	Restart the unit. If fault is persistent please contact your local Fortress Representative
AMBER FLASH	☼	Supply voltage out of range	Measure the supply voltage at the device and ensure it is within specification
AMBER / RED	🟠🔴	Short circuit on safety output signals	Confirm the safety outputs are not shorted together, or to any other signal
AMBER / BLUE	🟠🔵	Fault with safety contacts from associated tGard elements	Reset fault by opening and closing both safety contacts from any associated tGard elements
PURPLE	🟣	No RF actuator currently paired	Present the teach token for 5 seconds
PURPLE FLASH	☼	Waiting for new RF actuator to pair with	Present the new RF actuator within 60 seconds

* Misuse of Teach Token might have occurred.

Figure 1: Wiring Diagram OSSD

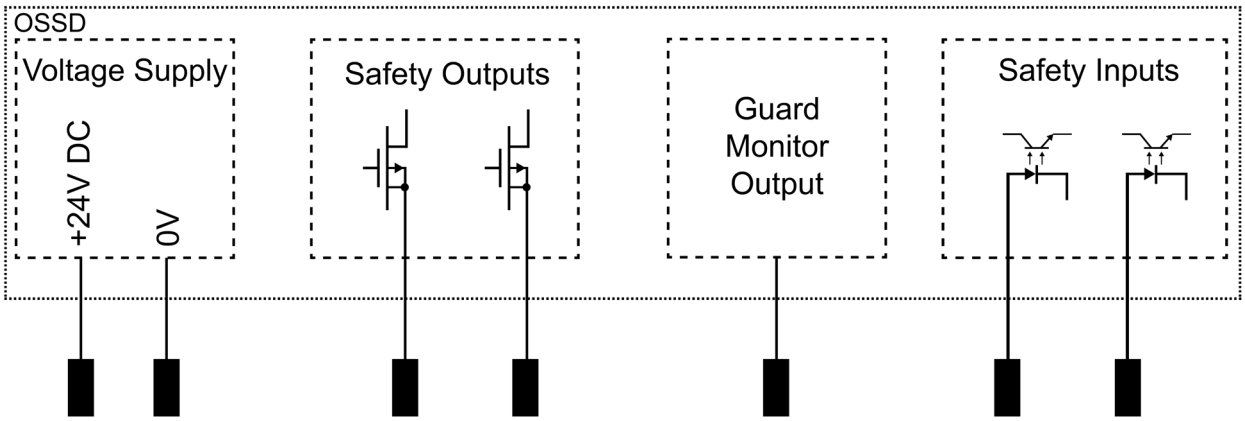
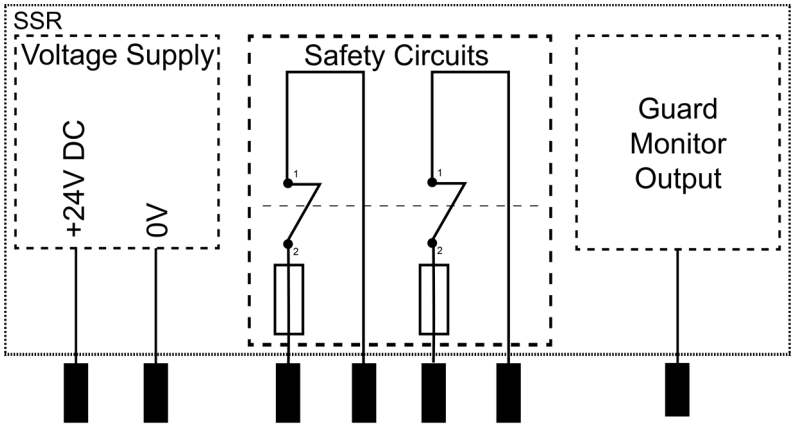
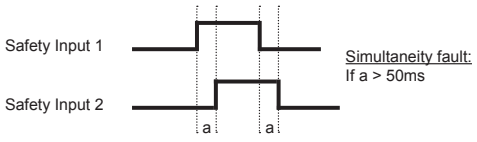


Figure 2: Wiring Diagram SSR



Two Safety Outputs	Two Safety Inputs
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 both signals for faults. • Have a Diagnostic Coverage of at least 99%. Require manual acknowledgement if the safety outputs become low whilst the unit is still locked.	Dual channel safety inputs with low (0v) voltage to indicate the safe state. Must be connected to the previous OSSD device or 24V. A fault will be detected if the inputs do not change simultaneously (see timing fault diagram). A full input cycle is needed to clear the fault. **Safety Inputs Timing Faults** 
Two Solid State Relay Safety Circuits	**Guard Monitor Output**
Dual channel SSR safety circuits with “open circuit” to indicate the safe state. Must be connected to 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%. • Be protected against short circuit.	Control output with high (24v) voltage to indicate active condition. The monitor is activated when the guard is opened.

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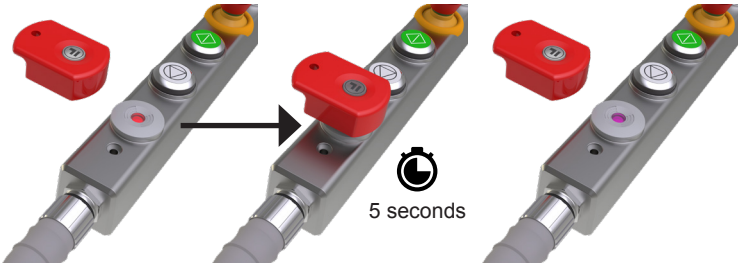
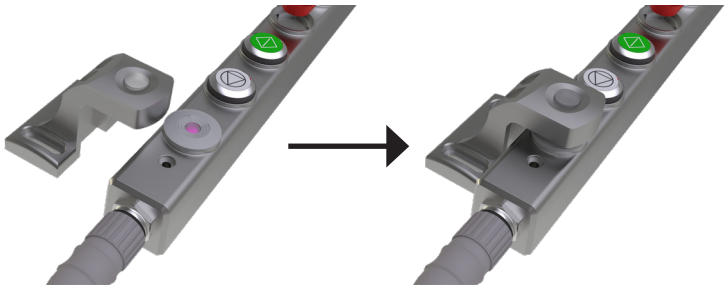
Reteaching Actuator Instructions

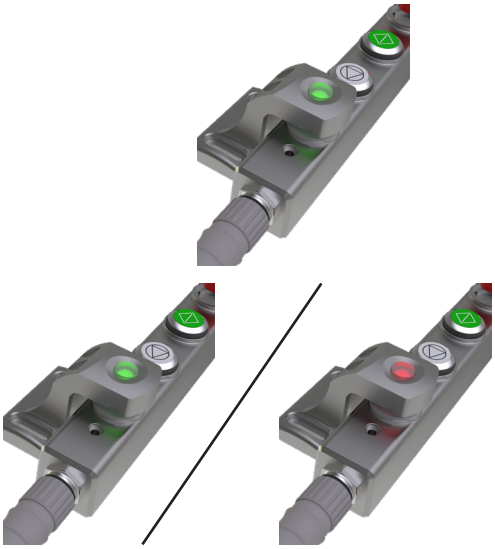
The tGard High Level Coded element is reteachable up to 10 times using the Teach Token accessory which can be used in the event of a damaged or lost actuator. Teach Token should be kept secure. Note: Teach Token sold separately.



1. Power the unit and ensure nothing is present in front of the tGard HLC element of the unit. The LED indicator should be red or purple.

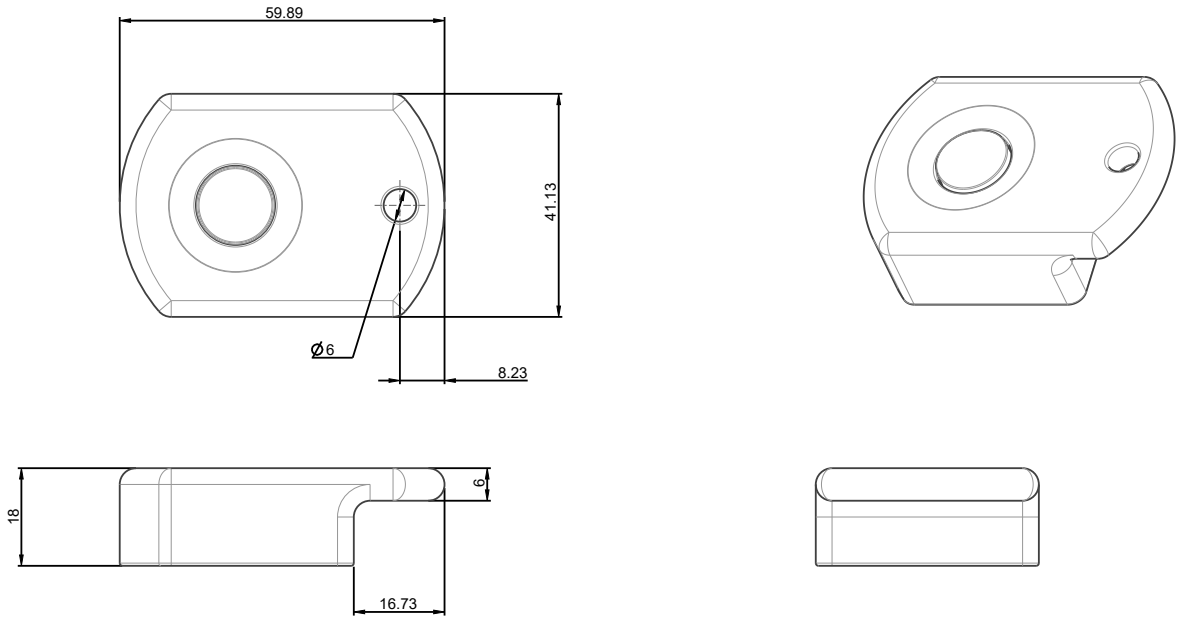
2. Present the TNX teach token, for 5 seconds. The LED should flash purple. If it is not flashing, please repeat this step.



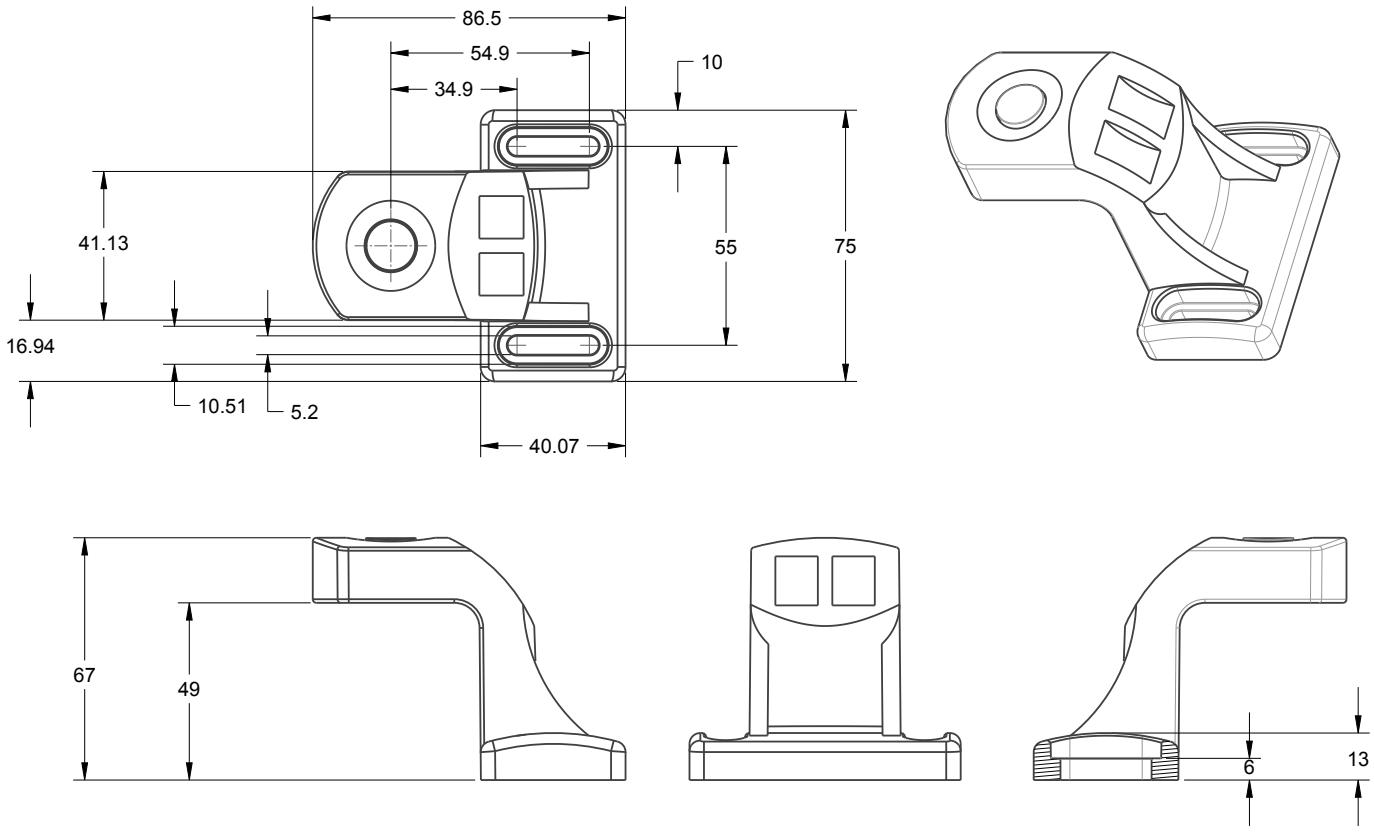


3. Present the new actuator to the RF element of the unit. The LED should become green or flashing between green and red as the new actuator is taught and current state is then shown. The device should then be tested before use.

Dimensional Drawing 1: TNX



Dimensional Drawing 2: TNH



Dimensional Drawing 3: TNA, TNB, TNC, TNR, TNS, TNT