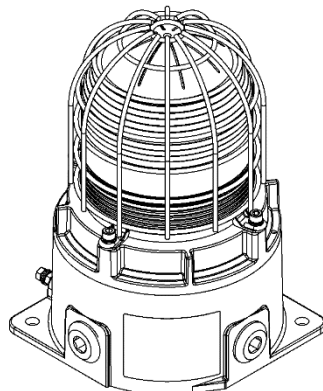


**INSTRUCTION MANUAL**  
**STExB2X05-S, STExB2X10-S & STExB2X15-S**  
**Flameproof Xenon Beacons – SIL2**  
**For use in Flammable Gas and Dust Atmospheres**



**STExB2X05-S**  
**STExB2X10-S**  
**STExB2X15-S**

**1) Product Table**

Standard	Model Number	Nom. Voltage	Voltage Range	Nom. Operating Current*	Max Current
ATEX / IECEX / UKEx / NEC / CEC	STExB2X05DC024-S	24Vdc	20-28Vdc	295mA	350mA
	STExB2X10DC024-S	24Vdc	20-28Vdc	605mA	710mA
ATEX / IECEX / UKEx	STExB2X15DC024-S	24Vdc	20-28Vdc	835mA	920mA

\*Rate at 1Hz

The table shows the input current taken by the various beacons.  
 Nominal current at nominal voltage and 1Hz flash rate.  
 Max. rated current at worst case supply voltage and flash rate.

Table 1: Electrical Ratings.

Ensure the system power supply is capable of providing the maximum current required for all beacons. Review associated cable size, length and quantity of beacons on each circuit.

## 2) Warnings



- DO NOT OPEN WHEN AN EXPLOSIVE ATMOSPHERE IS PRESENT.
- POTENTIAL ELECTROSTATIC CHARGING HAZARD – CLEAN ONLY WITH A DAMP CLOTH.
- ALL ENTRIES M20 X 1.5MM.
- USE SUITABLE RATED CABLES AND CABLE GLANDS IF TEMPERATURE EXCEEDS AS PER STANDARDS INDICATIONS BELOW.

FOR ATEX / IECEx & UKEx STANDARDS:

70°C AT ENTRY OR 80°C AT BRANCHING POINT.

FOR NEC / CEC STANDARDS:

60°C AT ENTRY OR 60°C AT BRANCHING POINT.

## 3) Marking & Rating Information

All units have a rating label, which carries the following important information:

- Unit Model.
- Voltage Range
- Nominal Voltage
- Max. Current

See Table 1 for electrical ratings of each Unit Model.

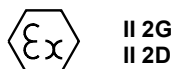
### 3.1. ATEX / IECEx & UKEx Ratings

Standards	
EN IEC 60079-0:2018 / IEC60079-0:2017 (Ed 7): Explosive Atmospheres - Equipment. General Requirements	
EN60079-1:2014 / IEC60079-1:2014 (Ed 7): Explosive Atmospheres - Equipment Protection by Flameproof Enclosures "d"	
BS EN 60079-31:2014 / IEC 60079-31:2013 (Ed 2): Explosive Atmospheres - Equipment Dust Ignition Protection by Enclosure "t"	
Ratings	
STExB2X05 DC024-S	Ex db IIC T5 Gb Ta -50°C to +70°C Ex db IIC T6 Gb Ta -50°C to +55°C Ex tb IIIC T92°C Db Ta -50°C to +70°C
STExB2X10 DC024-S	Ex db IIC T4 Gb Ta -50°C to +70°C Ex db IIC T5 Gb Ta -50°C to +45°C Ex tb IIIC T118°C Db Ta -50°C to +70°C
STExB2X15 DC024-S	Ex db IIC T4 Gb Ta -50°C to +70°C Ex tb IIIC T127°C Db Ta -55°C to +70°C

Certificate No.

DEMKO 16 ATEX1466X  
IECEx ULD 16.0017X  
UL21UKEX2019X

ATEX Mark, Equipment Group and Category:



CE Marking and Notified Body No.



UKCA Marking and Notified Body No.



## 3.2. NEC / CEC Ratings



All models are approved for use as Visual Signal Device for use as General Signalling:

UL1638A & CSA C22.2 No 205-17

### NEC Class / Zone Ratings US Codes

Standards	
UL 60079-0 (Ed. 7) 04/15/2020 Explosive Atmospheres - part 0: Equipment - General Requirements	
UL 60079-1 (Ed. 7) 2015 Explosive Atmospheres - Part 1: Equipment Protection by Flameproof Enclosures 'd'	
Ratings	
STExB2X05 DC024-S	Class I Zone 1 AEx db IIC T5 Gb Ta -50°C to +70°C Class I Zone 1 AEx db IIC T6 Gb Ta -50°C to +55°C
STExB2X10 DC024-S	Class I Zone 1 AEx db IIC T4 Gb Ta -50°C to +70°C Class I Zone 1 AEx db IIC T5 Gb Ta -50°C to +45°C

Installation must be carried out in compliance with the National Electric Code.

### CEC Class / Zone Ratings Canada

Standards	
CAN/CSA C22.2 No. 60079-0 (Ed. 4) 02/2019 Explosive Atmospheres - Part 0: Equipment - General Requirements	
CAN/CSA C22.2 No. 60079-1 (Ed. 3) 2016 Electrical Apparatus for Explosive Gas Atmospheres - Part 1: Flameproof Enclosures 'd'	
Rating	
STExB2X05 DC024-S	Ex db IIC T5 Gb Ta -50°C to +70°C Ex db IIC T6 Gb Ta -50°C to +55°C
STExB2X10 DC024-S	Ex db IIC T4 Gb Ta -50°C to +70°C Ex db IIC T5 Gb Ta -50°C to +45°C

Installation must be carried out in compliance with the Canadian Electric Code.

### NEC & CEC Class / Division Ratings for US / Canada, USL CNL

Standards	
STExB2X Xenon beacons	UL1638A (Ed. 1) 2016 Standard for Visual Signal Appliances for General Signalling Use CSA C22.2 No. 205-17 (Ed. 3) 2017 Signal Equipment
Ratings	
STExB2X05 DC024-S	Class I Div 2 Group ABCD T5 Ta -50°C to +70°C Class I Div 2 Group ABCD T6 Ta -50°C to +55°C
STExB2X10 DC024-S	Class I Div 2 Group ABCD T4 Ta -50°C to +70°C Class I Div 2 Group ABCD T5 Ta -50°C to +45°C

The certification approval has validated continuous use up to 38°C ambient and are for transient use up to 70°C ambient.

Installation must be carried out in compliance with the National Electric Code / Canadian Electric Code.

#### 4) Zones, Gas Group, Category and Temperature Classification

The units can be installed in locations with the following conditions:

Area Classification	
Zone 1	Explosive gas air mixture likely to occur in normal operation.
Zone 2	Explosive gas air mixture not likely to occur in normal operation, and if it does, it will only exist for a short time.
Zone 21 (ATEX / IECEx & UKEx only)	Explosive dust air mixture likely to occur in normal operation.
Zone 22 (ATEX / IECEx & UKEx only)	Explosive dust air mixture not likely to occur in normal operation, and if it does, it will only exist for a short time.
Gas Groupings	
Group IIA	Propane
Group IIB	Ethylene
Group IIC	Hydrogen and Acetylene
Temperature Classification for Gas Applications	
T1	450°C
T2	300°C
T3	200°C
T4	135°C (STExB2X10DC & STExB2X15DC up to 70°C ambient)
T5	100°C (STExB2X05DC up to 70°C ambient; STExB2X10DC up to 45°C ambient)
T6	85°C ATEX / IECEx / UKEx: (STExB2X05DC up to 55°C ambient) NEC / CEC: Up to 65°C ambient
Dust Groupings (ATEX / IECEx & UKEx only)	
Group IIIA	Combustible Flyings
Group IIIB	Non-conductive Dust
Group IIIC	Conductive Dust
Maximum Surface Temperature for Dust Applications (ATEX / IECEx & UKEx only)	
STExB2X05DC-S	92°C
STExB2X10DC-S	118°C
STExB2X15DC-S	127 °C
Equipment Category	
2G / 2D	
Equipment Level Protection	
Gb, Gc, Db, Dc	
Ambient Temperature Range	
-50°C to +70°C	

IP Rating
IP6X to EN/IEC60079-0 IP66 to EN60529

#### 5) Special Conditions for Safe Use

Repair of the flameproof threaded joints and cemented joints is not permitted.

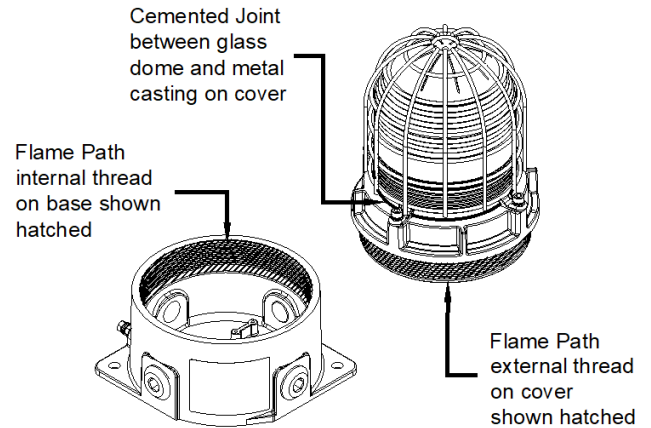


Figure 1: Flame Path.

The metallic enclosure has a non-conductive coating. These may generate an ignition-capable level of electrostatic charges under certain extreme conditions. The user should ensure that the equipment is not installed in a location where it may be subjected to external conditions that might cause a build-up of electrostatic charges on non-conducting surfaces.

All entries must be fitted with a suitable seal at the interface with enclosure.

#### 6) Product Mounting and Access

##### 6.1. Location and Mounting

The location of the beacons should be made with due regard to the area over which the warning signal must be visible. They should only be fixed to services that can carry the weight of the unit.

The STEx beacons should be securely bolted to a flat surface using 9.0mm diameter bolt holes in the base of the unit. See figure 2.

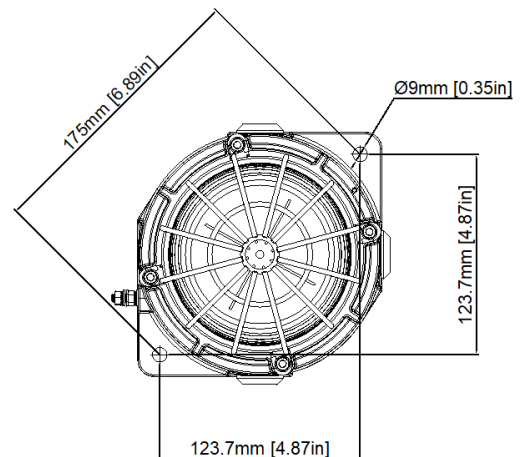


Figure 2: Fixing Location for B2 Beacon.

## 6.2. Access to the Flameproof Enclosure



Warning – Hot surfaces. External surfaces and internal components may be hot after operation, take care when handling the equipment.

In order to connect the electrical supply cables to the beacon it is necessary to remove the flameproof cover to gain access to the flameproof chamber. To access the Ex d chamber, loosen the M4 grub screw on the beacon cover. Open the enclosure by turning the beacon cover counterclockwise and remove the cover, taking extreme care not to damage the flameproof threads in the process (See figure 3).

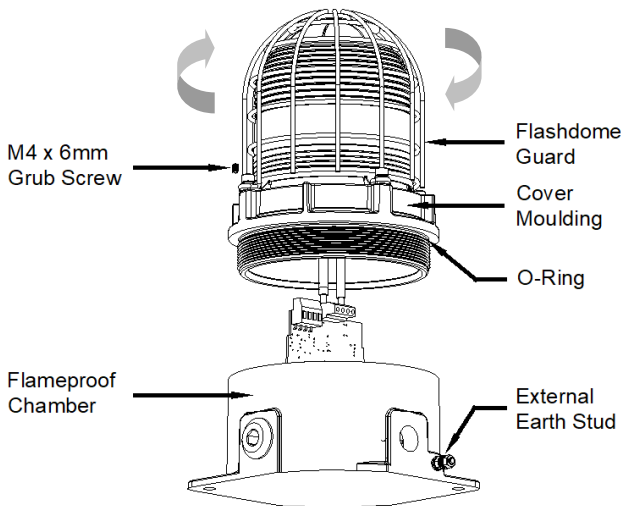


Figure 3: Accessing the Explosion Proof Enclosure.

On completion of the installation, the flameproof threaded joint should be inspected to ensure that they are clean and that they have not been damaged during installation.

Repair of the flame path / flameproof joints is not permitted.

Ensure that the 'O' ring seal is in place.

When fitting the flameproof cover ensure the thread is engaged correctly. Fully tighten the cover all the way, ensure no gap is visible between the cover and base of the beacon enclosure. Tighten the M4 grub screw.

## 7) Installation Requirements

### 7.1. Installation Standards Compliance



Warning – High voltage may be present, risk of electric shock. DO NOT open when energised, disconnect power before opening.

The beacon must only be installed by suitably qualified personnel in accordance with the latest issues of the relevant standards.

### ATEX / IECEx & UKEx installation standards

EN60079-14 / IEC60079-14: Explosive atmospheres - Electrical installations design, selection and erection.

EN60079-10-1 / IEC60079-10-1: Explosive atmospheres - Classification of areas. Explosive gas atmospheres.

EN60079-10-2 / IEC60079-10-2: Explosive atmospheres - Classification of areas. Explosive dust atmospheres.

The installation of the units must also be in accordance with any local codes that may apply and should only be carried out by a competent electrical engineer who has the necessary training.

### NEC / CEC Installation Standards

#### Cautions



Attention: Installation must be carried out by an electrician in compliance with the National Electrical Code, NFPA 70 or CSA 22.1 Canadian Electrical Code, Part I, Safety Standard for Electrical Installations, Section 32. / L'installation doit exclusivement être réalisée par du personnel qualifié, conformément au code national d'électricité américain, NFPA 70 ou CSA 22.1 Code canadien de l'électricité, première partie, norme de sécurité relative aux installations électriques, Section 32.



Attention: Disconnect from power source before installation or service to prevent electric shock / Débranchez-le de la source d'alimentation avant l'installation ou l'entretien pour éviter tout choc électrique.

The installation of the units must also be in accordance with any local codes that may apply and should only be carried out by a competent electrical engineer who has the necessary training.

## 7.2. Cable Selection and Connections

When selecting the cable size, consideration must be given to the input current that each unit draws (see table 1), the number of beacons on the line and the length of the cable runs. The cable size selected must have the necessary capacity to provide the input current to all of the beacons connected to the line.

Electrical connections are to be made into the terminal blocks on the PCBA, using solid wire 0.5-4mm<sup>2</sup> / AWG 20-12 or stranded wire, sizes 0.5-2.5mm<sup>2</sup> / AWG 24-14. Wire insulation needs to be stripped 8mm. Wires may be fitted securely with crimped ferrules.

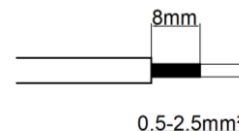


Figure 4: Wire Preparation.

Terminal screws need to be tightened down with a tightening torque of 0.45 Nm / 5 Lb-in. A 4-way terminal block is provided on the DC Beacon: 2-off +ve and 2-off -ve terminals.

See schematic diagram D191-06-621.

NEC / CEC Requirements Only

For high ambient temperatures the cable entry temperature may exceed 60°C or the cable branching point temperature may exceed 60°C and therefore suitable heat resisting cables and cable glands must be used, with a rated service temperature at least as stated below:

Model	Max Ambient Temperature (°C)												
	15	20	25	30	35	40	45	50	55	60	65	70	
STExB2													
X05DC							62	67	72	77	82	87	92
X10DC		61	66	71	76	81	86	91	96	101	106	111	

Table 3: NEC / CEC Min. Ratings of Cables & Cable Glands.

**Cable Glands & Blanking Plugs**

Appropriate cable glands to be customer supplied.

ATEX / IECEx & UKEx Requirements Only

The cable entries have an M20 x 1.5 – 6H entry thread. Only suitably rated and ATEX / IECEx & UKEx certified cable glands must be used. They must be suitable for the type of cable being used and also meet the requirements of the current installation standards EN 60079-14 / IEC60079-14.

If the installation is made using conduit, openings must have a sealing fitting connected as close as practical to the wall of the enclosure, but in no case more than the size of the conduit or 50mm, whichever is the lesser.

Any unused cable entries must be closed with suitably rated and ATEX / IECEx & UKEx certified blanking plugs.

NEC / CEC Requirements Only

The cable entries have an M20 x 1.5 – 6H entry thread. If the installation is made using cable glands, only suitably rated and certified cable glands must be used. They must be suitable for the type of cable being used and also meet the requirements of the current NEC / CEC installation standards.

If the installation is made using conduit, openings must have a sealing fitting connected as close as practical to the wall of the enclosure, but in no case more than the size of the conduit or 50mm, whichever is the lesser.

For use in Class I Division II locations, in order to maintain the db type protection, flameproof conduit seals and/or cable glands must be used.

Any unused cable entries must be closed with suitably rated and certified blanking plugs.

DC Units

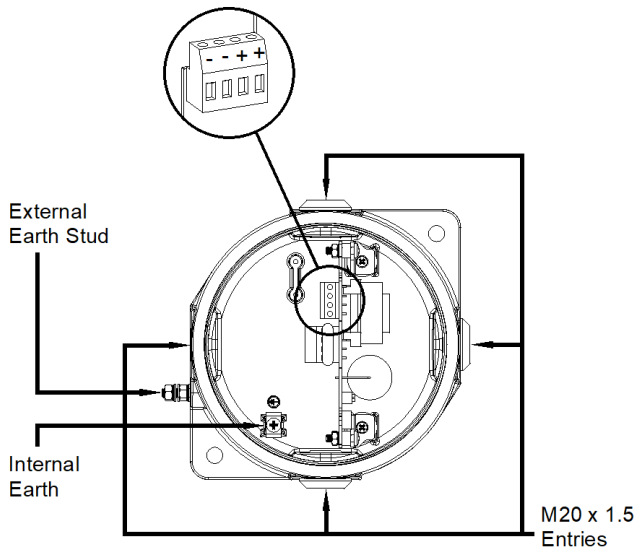


Figure 5: STExB2 Entries and Terminal Block Location.

When connecting wires to the terminals great care should be taken to dress the wires so that when the cover is inserted into the chamber the wires do not exert excess pressure on the terminal blocks. This is particularly important when using cables with large cross-sectional areas such as 2.5mm<sup>2</sup>.

**Earthing**

Internal earthing connections should be made to the Internal Earth terminal in the base of the housing using a ring crimp terminal to secure the earth conductor under the earth clamp. The earth conductor should be at least equal in size and rating to the incoming power conductors.

External earthing connections should be made to the M5 earth stud, using a ring crimp terminal to secure the earth conductor to the earth stud. The external earth conductor should be at least 4mm<sup>2</sup> in size.

**7.3. Cable Glands, Blanking Elements & Adapters**

Follow the minimum temperature ratings of cables and cable glands according to the approvals applied.

ATEX / IECEx & UKEx Requirements

For high ambient temperatures the cable entry temperature may exceed 70°C or the cable branching point temperature may exceed 80°C and therefore suitable heat resisting cables and cable glands must be used, with a rated service temperature at least as stated below:

Model	Max Ambient Temperature (°C)												
	15	20	25	30	35	40	45	50	55	60	65	70	
STExB2													
X05DC								72	77	82	87	92	
X10DC				71	76	81	86	91	96	101	106	111	
X15DC		72	77	82	87	92	97	102	107	112	117	122	

Table 2: ATEX / IECEx & UKEx Min. Ratings of Cables & Cable Glands.



## Ingress Protection

Follow instructions according to the approvals applied.

### ATEX / IECEx & UKEx Requirements Only

If a high IP (Ingress Protection) rating is required, then a suitable sealing washer must be fitted under the cable glands or blanking plugs. A minimum ingress protection rating of IP6X must be maintained for installations in explosive dust atmospheres.

For combustible dust applications, the cable entry device and blanking elements shall be in type of explosion protection and shall have an IP 6X rating.

### NEC / CEC Requirements Only

If a high IP (Ingress Protection) rating is required then a suitable sealing washer must be fitted under the cable glands or blanking plugs. A minimum ingress protection rating of IP6X must be maintained for installations in explosive dust atmospheres.

## Adapters

The STEx Beacon Range can be supplied with the following types of adapters:

- M20 to 1/2" NPT
- M20 to 3/4" NPT
- M20 to M25

It is important to note that stopping plugs cannot be fitted onto adapters, only directly onto the M20 entries.

Any other adapters used must be suitably rated and certified adapters.

## 8) Flash Pattern Settings

### 8.1. Flash Rate Setting



Warning – high-intensity light source.  
Avoid looking directly at the light source for extended periods of time.

The STExB2 beacons can produce different flash patterns as shown in Table 4. The flash patterns are selected by operation of the flash setting DIP switch on the PCBA (See Fig 6).

For SIL 2 operation, only the 1Hz Flash rate is approved.

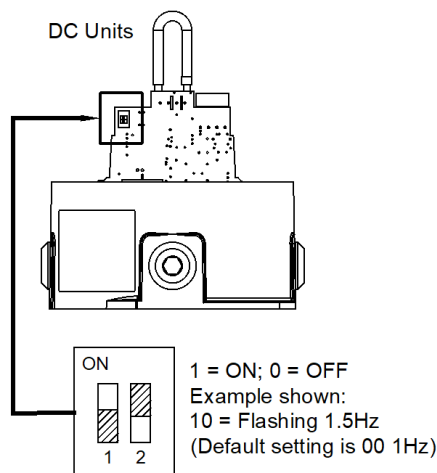


Figure 6: DIP Switch Location.

Switch Setting	S1 Mode	SIL Approved
00	1Hz (60FPM)	Yes
01	1.33Hz (80FPM)	No
10	1.5Hz (90FPM)	No
11	Double Flash	No

Table 4: Switch Positions for Flash Patterns

## 9) End of Line Monitoring (DC Units)

All DC units have a blocking diode fitted in their supply input lines. An end of line monitoring diode or an end of line monitoring resistor can be connected across the +ve and –ve terminals in the flameproof chamber. If an end of line resistor is used it must have a minimum resistance value of 3k3 ohms and a minimum wattage of 0.5W or a minimum resistance value of 500 ohms and a minimum wattage of 2W.

The resistor must be connected directly across the +ve and –ve terminals as shown in the following drawing. The resistor leads should be kept as short as possible.

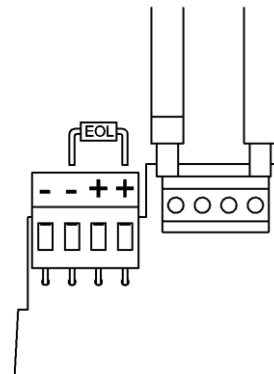


Figure 7: End of Line Resistor Placement.

SIL2 line monitoring module product version: see section 19 for standard default values and product coding. See document D191-06-621 for associated wiring diagram.

## 10) Interchangeable & Spare Parts



Warning – Hot surfaces. External surfaces and internal components may be hot after operation, take care when handling the equipment.

The beacon lens is interchangeable, contact European Safety Systems Ltd for a replacement lens available in various colours.

The guard is an integral part of the protection and must be reassembled exactly the same way as it was disassembled.

To change the lens, unscrew the M5 socket head screws and remove the M5 screws, M5 spring & flat washers.

## 11) Maintenance, Overhaul and Repair

Maintenance, repair and overhaul of the equipment should only be carried out by suitably qualified personnel in accordance with the current relevant standards:

### ATEX / IECEx & UKEx Requirements Only

EN60079-19/IEC60079-19 Explosive atmospheres – Equipment repair, overhaul and reclamation

EN 60079-17/IEC60079-17 Explosive atmospheres – Electrical installations inspection and maintenance

Units must not be opened while an explosive atmosphere is present.

If opening the unit during maintenance operations a clean environment must be maintained and any dust layer removed prior to opening the unit.

Repair of the flameproof threaded joints and cemented joints is not permitted.

Potential electrostatic charging hazard - Clean only with a damp cloth.

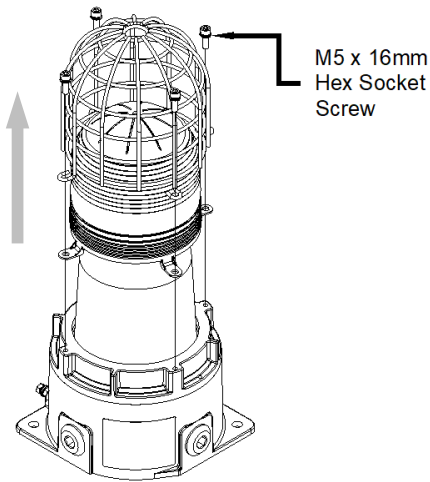


Figure 8: Removal of Lens.

Remove the guard and replace the old lens with the new lens.

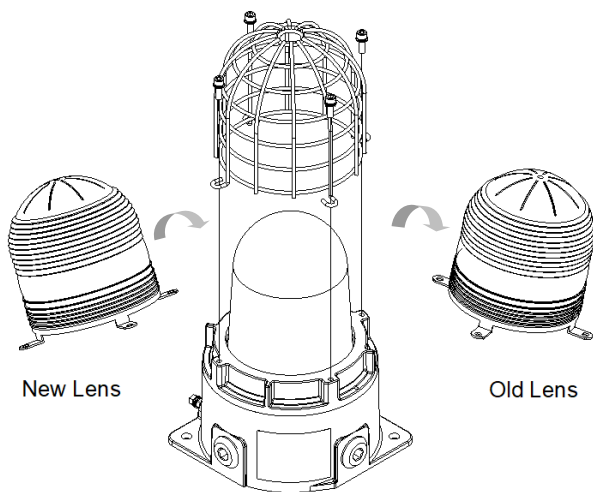


Figure 9: Changing of Lens.

Fit the guard back on to the lens and casting, align the holes of the guard, lens and casting. To reattach the lens, the fixings **MUST** be in the order shown in Figure 10.

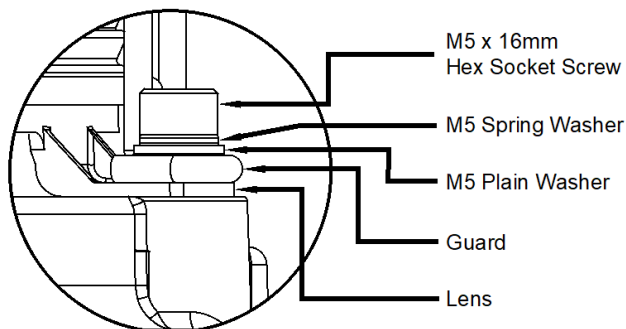


Figure 10: Lens & Guard Fixings Order.

## 12) SIL 2 Instruction Safety/Manual

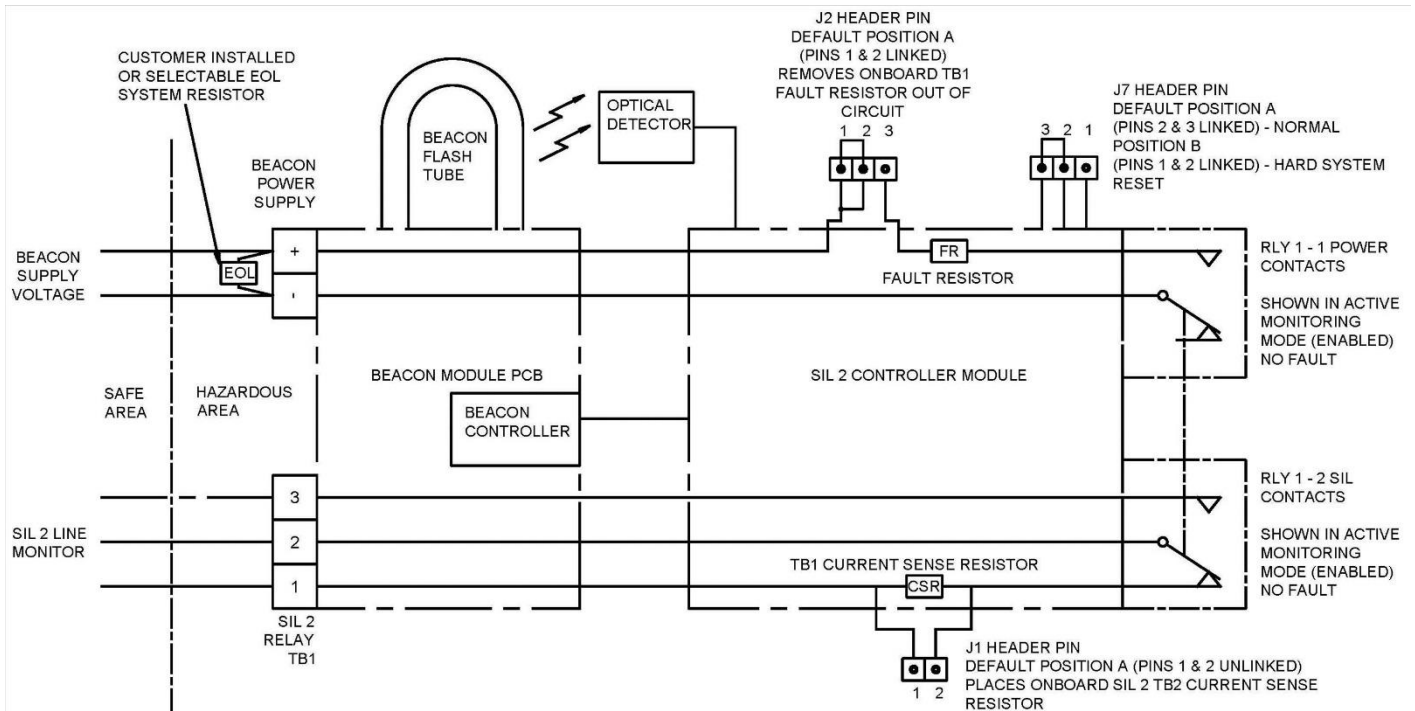


Figure 11: The SIL 2 Module monitors the Beacon and interfaces to the customer plant.

**Warning** – To maintain the integrity of the SIL 2 units the system must be installed, commissioned and used within the parameters outlined in this manual. Failure to comply could result in an unintended unit operation or function.

**Warning** – The unit must be powered in either Standby or Active modes to comply with the SIL 2 approval requirement. If the power is disrupted the unit must be allowed to go through the commissioning cycle to reset. Failure to complete the commissioning cycle and continued disruption in the power supply will generate a fault state which will require the beacon to be reset (see section 15-4).

### SIL 2 System Description

The SIL 2 module monitors the function of the device and provides feedback to the control panel. A fault condition can be communicated by two methods:

- 4 wire installation can be seen as per section 15-1. A SIL 2 system wiring for fault detection in standby and active mode with independent fault contacts.
- 2 wire installation can be seen as per section 15-2. A SIL 2 system by the introduction to the monitoring circuit and linking in an end of line resistor can only register the fault in standby mode.

### 13) SIL 2 System Terms and Function

The SIL 2 Beacon Unit Monitors:

- Standby mode and Active mode
- Health status of power supply
- Beacons correct function and flash pattern

The SIL 2 beacon operates as part of a SIL 2 system.

The beacon will after commissioning remain powered in **Standby mode** (reverse polarity) until the beacon is required to operate. When the signalling device is required to operate beacon the polarity is changed back to normal supply and the beacon will go into **Active mode** where it will start to function/flash. When periodically testing the system and beacons, operation is put into **Active mode**.

The system panel or PLC will control whether the system is in either of the main two operational modes.

**Standby Mode** – This is where the power supply polarity is reversed so negative (–ve) is fed to the positive (+) beacon terminal and positive (+) is fed to the negative (–ve) beacon terminal.

In Standby mode the beacon will not flash but the SIL 2 unit is monitoring power supply and is set-up ready to go to Active (alarm) mode.

Power relay RLY1-1 will be open whilst SIL 2 relay RLY1-2 will be closed contact between terminals 1 & 2.

If power is disrupted the SIL 2 unit will go into **Fault mode**, in fault mode the Power relay RLY1-1 will close whilst SIL 2 relay RLY1-2 will become an open circuit between terminals 1 & 2.

**Active Mode** – This is where the power is in normal polarity, positive (+) supplied to the positive (+) beacon terminal and negative (–ve) is supplied to the negative (–ve) beacon terminal.

In Active mode the beacon will output the selected flash pattern. The SIL 2 module checks for the correct flash pattern output and the functionality of the flash signal generation process.

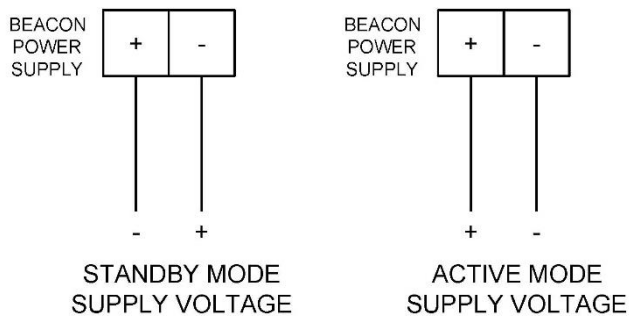
Power relay RLY1-1 will be open whilst SIL 2 relay RLY1-2 will be closed contact between terminals 1 & 2.



The SIL 2 unit will also check for signal polarity.

If a fault is found the SIL 2 unit will go into **Fault mode**.

If power is disrupted the SIL 2 unit will go into **Fault mode**, in fault mode the Power relay RLY1-1 will close whilst SIL 2 relay RLY1-2 will become an open circuit between terminals 1 & 2.



**Fault modes** - The fault modes listed in sections 13-1 & 13-2 will result in a change of state for relays RLY1-1 and RLY1-2.

In fault mode the Power relay RLY1-1 will close whilst SIL 2 relay RLY1-2 will become open between terminals 1 & 2.

### 13-1 Beacon Failure

- Flash Failure – No flash detected.
- Beacon Controller Failure – No flash trigger pulse detected.
- Flash Rate Failure – Regular 1 Hz flash cycle erratic.

### 13-2 Power Failure / SIL 2 Failure

- SIL 2 Controller Failure – Internal function and system checking flags fault.
- Rapid Power Cycling – System indicates power instability.
- Total Power Failure.

It is possible to reset these faults if they were transitory.

**Resetting Failure (by power cycling)** - It is possible that the SIL 2 unit can be reset by powering the unit off for a period greater than 20 seconds. On restarting the unit and running through the commissioning cycle the fault may clear.

**Resetting Failure (by Hard Reset)** - It is possible that the SIL 2 unit can be reset by hard resetting the unit using the reset jumper within the unit (see section 15-4) on hard resetting. On restarting the unit and running through the commissioning cycle, the fault may clear. It is necessary to run the test function cycle again to see if the fault is still evident.

If the hard reset process does not correct the latched fault the alarm horn sounder may require further investigation, please contact your local E2S representative.

### **Commissioning System - Functional start-up of System (Normally in reverse polarity mode)**

When Commissioning system the power must not be disrupted to the SIL 2 Unit within the unit's initialization cycle which is **5 seconds**.

Once past this period the SIL 2 system is fully operational and will be in monitoring the beacon and power in Standby mode.

The relay RLY1-2 on the SIL 2 unit will only remain open for a maximum of 1 second on commissioning start-up. RLY1-2 will subsequently close contacts 1 & 2 indicating healthy operation. Contact 1 & 2 will only remain open in the event of a fault or a loss of power.

### **System Testing (Active Mode normal polarity)**

The SIL 2 system will remain monitoring the power in standby mode until the polarity is changed to normal mode to enable an active system for beacon functional testing.

**Important:** - The polarity must be held in active mode for a period in excess of **15 seconds** to ensure a full system check is performed.

Once the test period has been completed the unit can be switched back to standby mode by reversing the polarity.

If no faults have been found during the test the relays will remain in steady state.

The SIL 2 unit will continue to monitor the power and module function.

**Important:** - The automated test cycle **must** be undertaken on at least a weekly basis to maintain the SIL 2 units reliability.

### **System Activation (Active Mode normal polarity)**

The SIL 2 system will remain monitoring the power in standby mode until the polarity is changed to Active mode to enable an active system for beacon to function as a warning signaling device.

**Important** :- The polarity must be held in active mode for a period in excess of 15 seconds to ensure a full system check is performed whilst in alarm mode, although it is expected that during a system activation this period will be significantly greater.

**Note** :- The fault indication signal on TB1 can take up to 1.5 seconds to indicate system fault.

## 14) SIL 2 Wiring Configuration and Beacon Set-Up

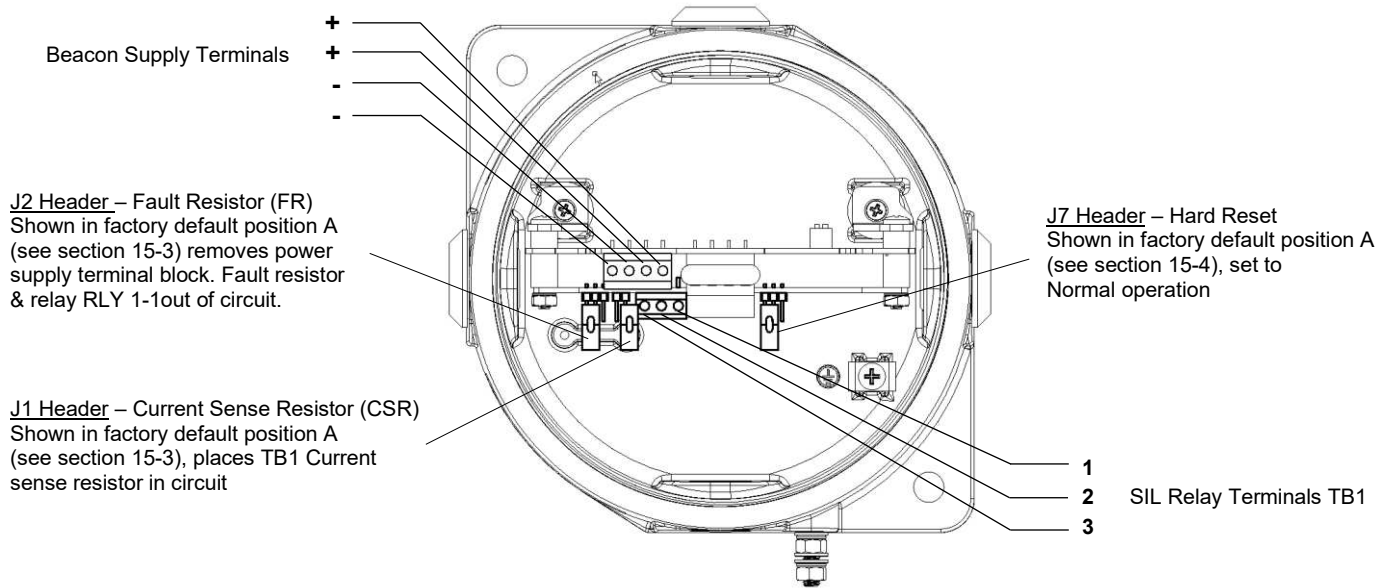


Figure 12: Terminals and header pins for beacon.

Power & Communication with the system control panel can be configured in two ways: - Although it is **highly** recommended that the unit is wired as stated in section 15-1 as a 4-Wire System.

## 15-1) SIL 2 System Wiring for Fault Detection in Standby and Active Mode – 4 Wire Installation (Recommended)

The customer is required to wire into both the beacon power supply terminals and also the SIL 2 Relay terminals TB1.

The power supply terminals only need to have the supply power connected. This will be reverse polarity for monitoring mode and normal polarity for active mode. There is no need to fit an EOL resistor on the power supply terminal as the TB1 is configured to raise a fault alarm in any situation.

Terminal block TB1 is the output from the SIL 2 monitoring relay. Relay RLY 1-2 provides a closed circuit between TB1 terminals 1 & 2 whilst powered. On detection of a fault event this will become open circuit.

The fault will be seen via the SIL 2 TB1 terminals as soon as the fault occurs in either Active or Standby modes.

When no fault is detected the circuit to the SIL 2 TB1 terminals 1 & 2 will include a factory fitted 3.3K Ohm current sense resistor (CSR) in series. When the circuit is driven with 24Vdc the detection current seen is ~7.3mA @ 24V.

The only other fault mode is if the cable goes short circuit where a short will be seen by the panel.

**Option:** Should the fault event output of RLY1-2 be required to operate as a switch, header J1 can be set to link pins 1 & 2 (see Figure 13) thereby removing the 3.3k Ohm current sense resistor (CSR) from the circuit.

**Note:** a cable short circuit will not be detectable in this configuration.

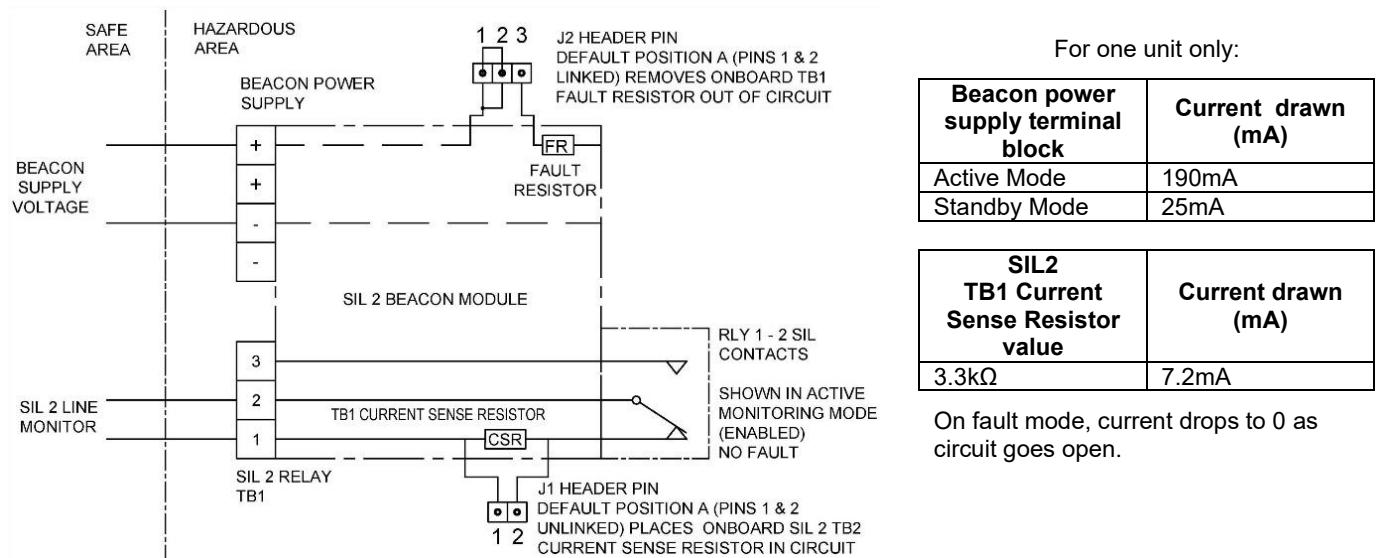


Figure 13: Schematic of SIL 2 system wiring for fault detection in standby and active mode – 4 wire installation.

If multiple SIL 2 alarm horn sounders are to be cabled in series, the monitoring connections differ from that of a single beacon. For more information see manual D197-00-621-IS available from the E2S website.

## 15-2) SIL 2 System Wiring for Fault Detection in Standby Mode Only – 2 Wire Installation

Cabling is required to the positive '+' and negative '-' power input terminals only. Monitoring will occur in standby mode only whilst power supply polarity is reversed. An EOL resistor may be added during installation or can be factory fitted. See Table 5 for EOL resistor value guidance.

The SIL2 monitoring module contains a factory fitted Power Supply Fault Resistor 2.2k Ohm (FR). When a fault is detected the Fault Resistor will activated. The total measurable resistance of the EOL resistor and Fault Resistor across the power terminals which already has customer EOL resistor (2.2kΩ) in place. This will result in a total fault detection current of 41.8mA @ 24V but can only be detected when unit is in Standby Mode.

**Important:** - The 2 wire configuration will not warn of a fault whilst in Active mode. A fault will only be detectable in standby mode when power supply polarity is reversed.

**Important:** - The 2-wire configuration requires the J2 header pin to be set to position B (see figure 16). Factory default position is A.

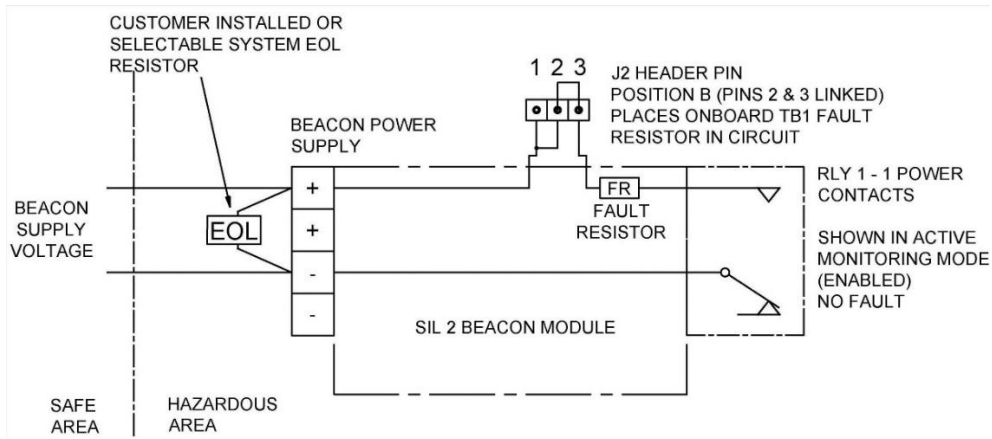


Figure 14: Schematic of SIL 2 system wiring for fault detection in standby mode only – 2 wire installation.

To evaluate the total current drawn from the SIL 2 unit, use the equation below.

$$\begin{matrix} I \\ \text{(Total Current} \\ \text{drawn)} \end{matrix} = \begin{matrix} I_{FR} \\ \text{(Current drawn from} \\ \text{Fault Resistor)} \end{matrix} + \begin{matrix} I_{EOL} \\ \text{(Current drawn from} \\ \text{Customer EOL resistor)} \end{matrix} + \begin{matrix} I_{SIL} \\ \text{(Current drawn} \\ \text{from SIL board)} \end{matrix}$$

In standby mode, where there is no fault, RLY 1-1 is open. This means the voltage only passes through the customer EOL resistor and the current drawn from the SIL 2 board is 25mA. Therefore, the equation for a No Fault scenario is then:

$$\begin{matrix} I_{NF} \\ \text{(Standby Mode, Total Current drawn - No Fault)} \end{matrix} = \begin{matrix} I_{FR} \\ \text{(0mA)} \end{matrix} + \begin{matrix} I_{EOL} \\ \text{(See table 5)} \end{matrix} + \begin{matrix} I_{SIL} \\ \text{(25mA)} \end{matrix}$$

In standby mode, where there is a fault, the circuit is closed. This means the voltage passes through both the customer EOL resistor and current sense resistor and the current drawn from the SIL 2 board is 20mA. The customer must first calculate the resistance of the two resistors in parallel before applying the currents to the equation. The equation for a Fault scenario is then:

$$\begin{matrix} I_F \\ \text{(Standby Mode, Total Current drawn - Fault)} \end{matrix} = \begin{matrix} I_{TR} \\ \text{(Total Resistance when EOL \& FR in parallel)} \end{matrix} + \begin{matrix} I_{SIL} \\ \text{(20mA)} \end{matrix}$$

Standby Mode	Power Supply Fault Resistor		Customer EOL Resistor		(Fault Mode Only)		Current drawn from SIL Board	Total current drawn
	Resistor Value	Current drawn ( $I_{FR}$ )	Resistor Value	Current drawn ( $I_{EOL}$ )	Total resistance	Current drawn ( $I_{TR}$ )		
No Fault	2.2 kΩ	0 mA	2.2 kΩ	10.9 mA	-	-	25 mA	35.9 mA
Fault		-		-	1.1 kΩ	21.8 mA	20 mA	41.8 mA
No Fault	1.0 kΩ	0 mA	1.0 kΩ	24.0 mA	-	-	25 mA	49.0 mA
Fault		-		-	500 Ω	48.0 mA	20 mA	68.0 mA
No Fault	2.2 kΩ	0 mA	3.3 kΩ	7.3 mA	-	-	25 mA	32.3 mA
Fault		-		-	1.3 kΩ	18.2 mA	20 mA	38.2 mA
No Fault	1.8 kΩ	0 mA	3.9 kΩ	6.2 mA	-	-	25 mA	31.2 mA
Fault		-		-	1.2 kΩ	19.5 mA	20 mA	39.5 mA
No Fault	1.8 kΩ	0 mA	4.7 kΩ	5.1 mA	-	-	25 mA	30.1 mA
Fault		-		-	1.3 kΩ	18.4 mA	20 mA	38.4 mA
No Fault	2.2 kΩ	0 mA	4.7 kΩ	5.1 mA	-	-	25 mA	30.1 mA
Fault		-		-	1.5 kΩ	16.0 mA	20 mA	36.0 mA

Table 5: Resistor combinations and the currents drawn when no faults and faults occur.

If multiple SIL 2 alarm horn sounders are to be cabled in series, the monitoring connections differ from that of a single beacon. For more information see manual D197-00-621-IS available from the E2S website.

### 15-3) Header Pins Settings

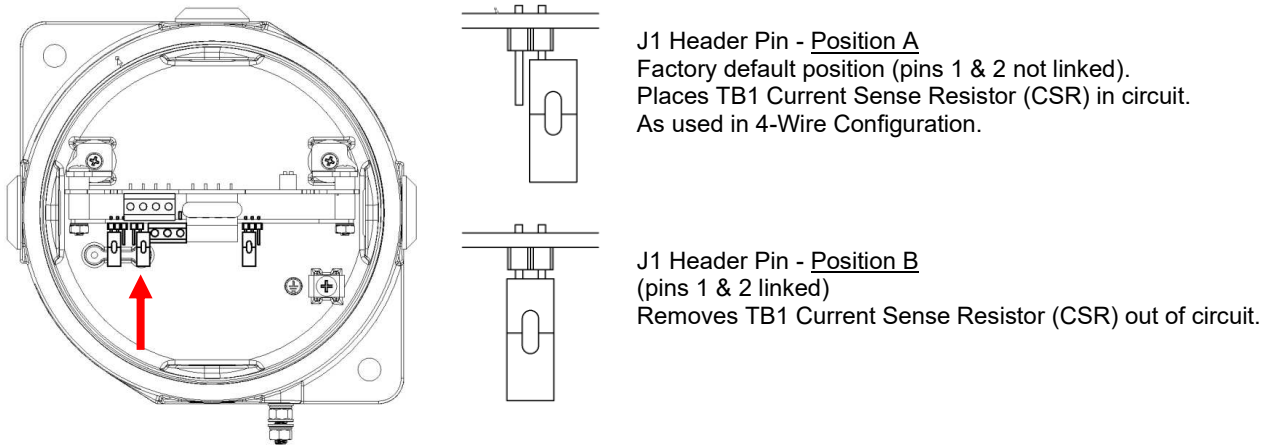


Figure 15: J1 Header pin positions – Current Sense Resistor (CSR)

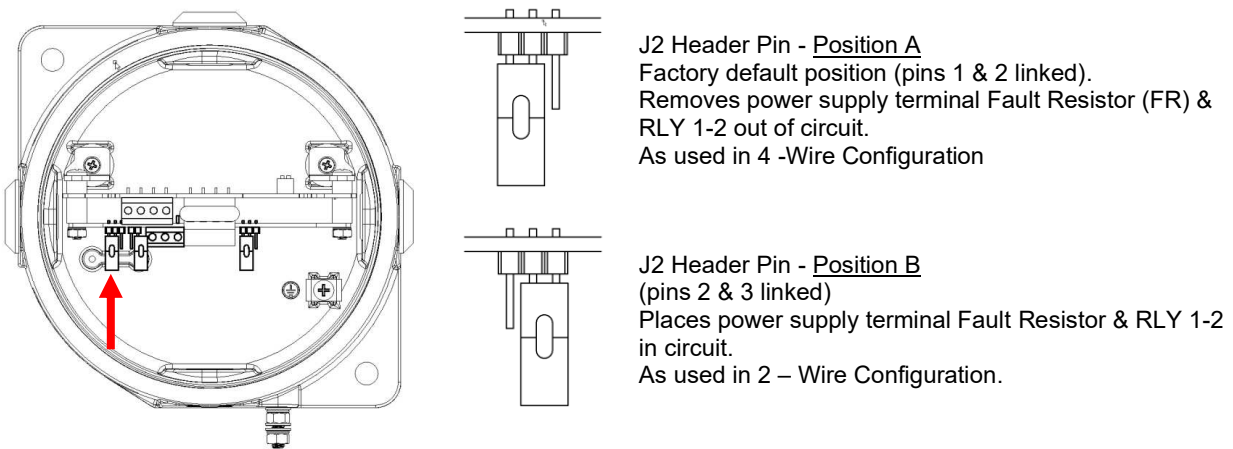


Figure 16: J2 Header pin positions – Fault Resistor (FR)

### 15-4) SIL 2 Hard Reset Function

Power down the unit completely for a minimum of 30 seconds. Move the hard reset header pin (Jumper J7) to reset position B shown. Then power the unit for a minimum of 5 seconds. Power down the unit for 30 seconds and then move the header pin back to Position A.

The unit has now been reset.

If the hard reset process does not correct the latched fault the beacon may require further investigation. Please contact your local E2S representative.

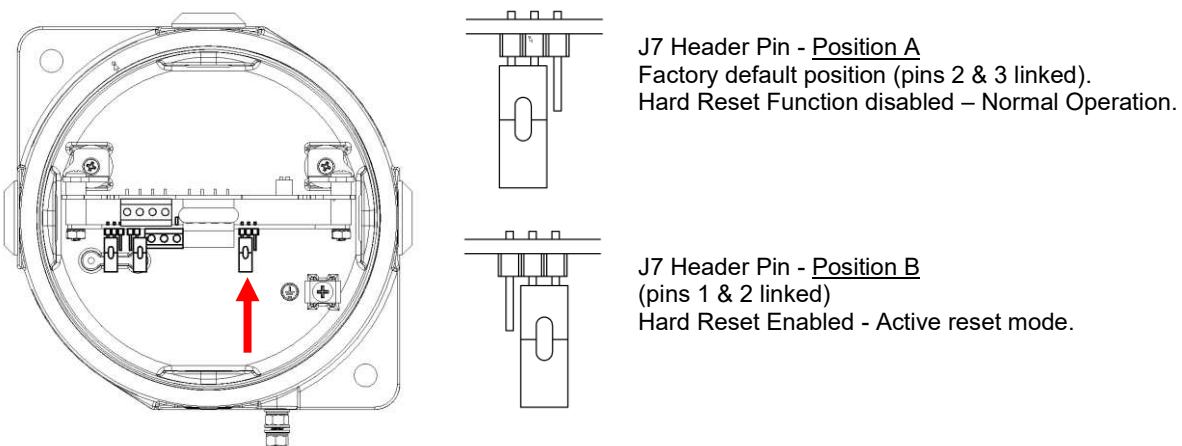


Figure 17: J7 Header pin positions – Hard Reset Function

## 16) SIL 2 Specific Unit Mounting Requirements

The beacon should be mounted no closer than 2m from a beacon or light source of similar candela output. This is to ensure false light activation does not occur when the unit is monitoring the light pulse duration and flash failure.

## 17) SIL 2 Reliability Data

Reliability and Functional safety IEC/EN61508 which has been assessed and is considered suitable for use in low demand safety function:

1. Random Hardware Failures and Architectural constraints (route 1<sub>H</sub>).
2. As an unvoted item (i.e. hardware fault tolerance of 0) at SIL 2.

The product was assessed against failure modes:

- Failure respond to an input by lighting a beacon.
- Spurious light output despite no input.

Integrity in respect of failure to release	SIL 2
Total Failure rate	0.35 pmh
"Hazardous" failure rate (revealed)	0.287 pmh
"Hazardous" failure rate (unrevealed)	0.003 pmh
"Safe" failure rate (revealed)	0.006 pmh
"Safe" failure rate (unrevealed)	0
Diagnostic Coverage	99%
System type	B
Hardware Fault Tolerance	0
Safe Failure Fraction	>99%
PFD (hazardous failure)	$3.7 \times 10^{-5}$
Proof Test Interval	Up to 1 year

## 18) Synchronised Operation

All STExB2 SIL2 beacons that are connected to the same supply line will have a synchronised flash rate at one flash every second.



## 19) Product Coding for Fault Resistor and Customer EOL Resistor

The customer is able to identify the resistor values chosen on purchase from the product code. This is represented by the last two characters:

STExB2X05DC024AS1S1R/A-**AFZ**

- The first A character denotes the value of the Fault Resistor (FR). Default value is 2.2K Ohm (Code = A) unless an alternative value is requested when ordering.
- The second F character denotes the value of the Current Sense Resistor (CSR). Default value is 3.3K Ohm (Code = F) unless an alternative value is requested when ordering.
- The third Z character denotes the value of the unit End Of Line Resistor (EOL). By default no EOL resistor is factory fitted (Code = Z). A factory fitted EOL resistor can be specified when ordering.

The values of resistors available are shown in table 6 below.

Code	Resistor Value
A	2.2 kΩ
B	1.0 kΩ
C	1.5 kΩ
D	1.8 kΩ
E	2.7 kΩ
F	3.3 kΩ
G	3.9 kΩ
H	4.7 kΩ
J	5.6 kΩ
K	6.8 kΩ
L	8.2 kΩ
M	11 kΩ
Z	None Fitted

Default resistor coding is as follows:

STExB2X05DC024AS1S1R/A-**AFZ**

Example of a custom requirement resistor coding:

STExB2X05DC024AS1S1R/A-**GEF**

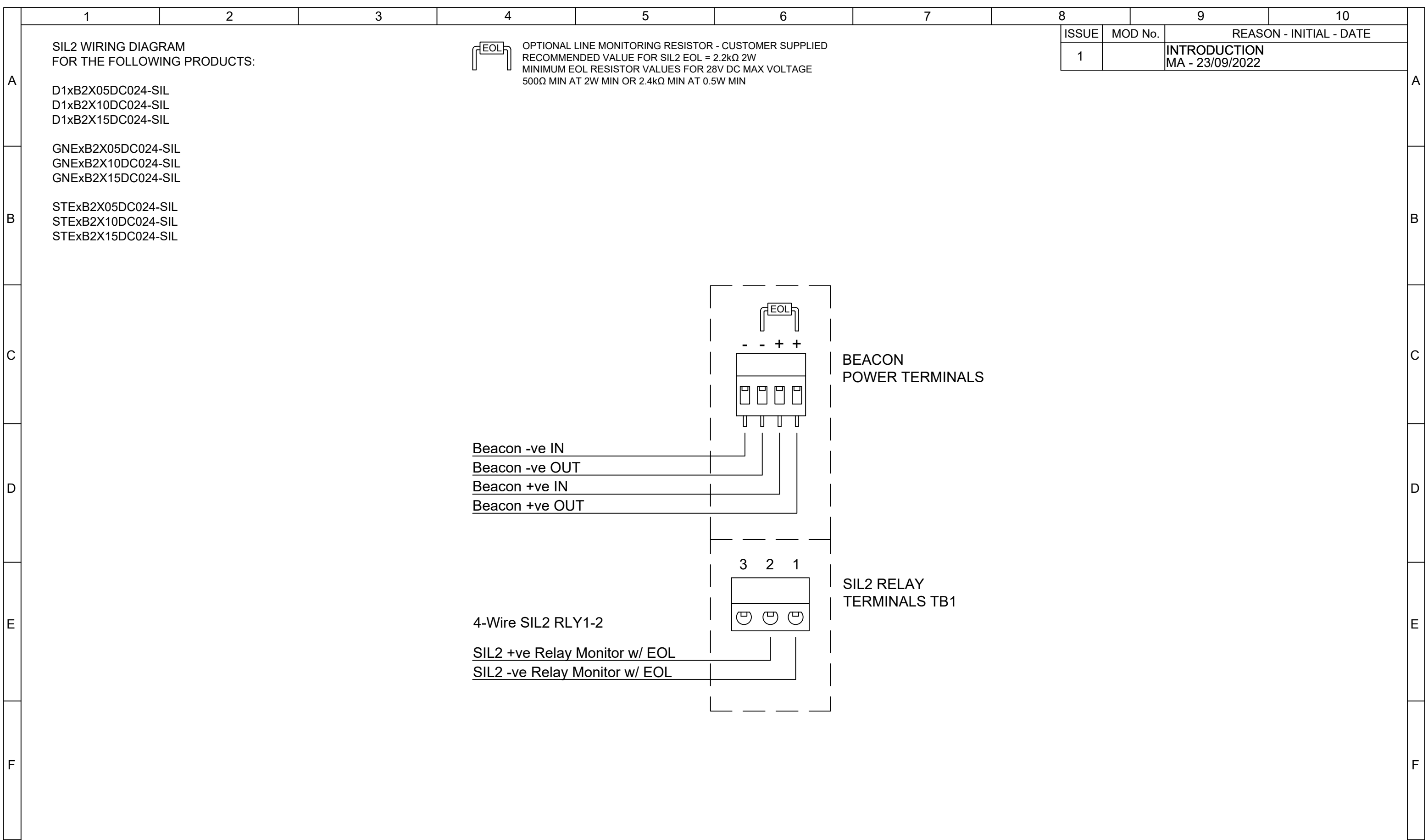
Where the (FR) Fault Resistor is (G = 3.9 kΩ)  
 (CSR) Current Sense Resistor is (E = 2.7 kΩ)  
 (EOL) End Of Line resistor is (F = 3.3 kΩ)


**Note:** To utilise the full monitoring functionality the 4-wire configuration is recommended. An EOL resistor is not required for this configuration.

The alternative 2-wire configuration requires an EOL resistor to be fitted. The EOL resistor can be specified during ordering and factory fitted or selected and fitted during the beacon installation.

See section 9 for EOL resistor location and wattage requirements. E2S recommends a value of 2.2K Ohm. If an alternative value is required, please see section 15-2.

Both the (FR) Fault Resistor and (CSR) Current Sense Resistor are factory fitted and cannot be user replaced.



 OPTIONAL LINE MONITORING RESISTOR - CUSTOMER SUPPLIED  
 RECOMMENDED VALUE FOR SIL2 EOL = 2.2kΩ 2W  
 MINIMUM EOL RESISTOR VALUES FOR 28V DC MAX VOLTAGE  
 500Ω MIN AT 2W MIN OR 2.4kΩ MIN AT 0.5W MIN

8	9	10
ISSUE	MOD No.	REASON - INITIAL - DATE
1		INTRODUCTION MA - 23/09/2022

SIL2 WIRING DIAGRAM  
FOR THE FOLLOWING PRODUCTS:


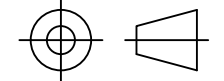
D1xB2X05DC024-SIL  
D1xB2X10DC024-SIL  
D1xB2X15DC024-SIL

GNExB2X05DC024-SIL  
GNExB2X10DC024-SIL  
GNExB2X15DC024-SIL

STExB2X05DC024-SIL  
STExB2X10DC024-SIL  
STExB2X15DC024-SIL

A  
B  
C  
D  
E  
F

A  
B  
C  
D  
E  
F

DRAWING TO BS8888:2000 GEOMETRIC TOLERANCES TO ISO1101:1983 LINEAR DIMENSIONAL TOLS ANGULAR DIMENSIONAL TOLS	DRAWN <b>M.ABALOS</b>	DATE <b>23/09/2022</b>	SURFACE FINISH	WEIGHT (Kg)	THIS DRAWING AND ANY INFORMATION OR DESCRIPTIVE MATTER THEREIN IS COMMUNICATED IN CONFIDENCE AND IS THE COPYRIGHT PROPERTY OF EUROPEAN SAFETY SYSTEMS LTD. NEITHER THE WHOLE OR ANY EXTRACT MAY BE DISCLOSED, LOANED, COPIED OR USED FOR MANUFACTURING OR TENDERING PURPOSES WITHOUT THEIR WRITTEN CONSENT. © EUROPEAN SAFETY SYSTEMS LTD. AS PER LATEST DATE OF ISSUE SHOWN ABOVE	 warning signals EUROPEAN SAFETY SYSTEMS LTD IMPRESS HOUSE MANSSELL ROAD ACTON LONDON W3 7QH WWW.E2S.COM	ALL DIMENSIONS IN MM IF IN DOUBT, ASK - DO NOT SCALE		<b>A3</b>	
	CHECKED <b>B.ISARD</b>	DATE <b>23/09/2022</b>	MATERIAL				TITLE <b>D1xB2 / GNExB2 / STExB2 SIL2 DC XENON BEACON WIRING DIAGRAM</b>	SCALE <b>NTS</b>	SHEET <b>1 OF 1</b>	DRAWING NUMBER <b>D191-06-621</b>
	STANDARDS <b>D1x</b>	APPROVED <b>R.N.POTTS</b>	DATE <b>23/09/2022</b>	ALTERNATIVE MATERIAL						

# EU Declaration of Conformity



Manufacturer: European Safety Systems Ltd.  
Impress House, Mansell Road, Acton  
London, W3 7QH  
United Kingdom

Authorised Representative: E2S Warnsignaltechnik UG  
Charlottenstrasse 45-51  
72764 Reutlingen  
Germany

Equipment Type: STExS1, STExS2, STExL1, STExL2  
STExB2X05, STExB2X10, STExB2X15, STExB2X21  
STExB2LD2, STExB2RT1  
STExC1X05  
STExJ2

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## Directive 2014/34/EU: Equipment and Protective Systems for use in Potentially Explosive Atmospheres (ATEX)

Notified Body for EU type Examination (Module B):	UL International Demko A/S Notified Body No.: 0539 Borupvang 5A, 2750 Ballerup, Denmark
EU-type Examination Certificate (Module B):	DEMKO 16ATEX1466X
Notified Body for Quality Assurance Notification / Conformity to EU-type based on quality assurance of the production process (Module D):	Sira Certification Service Notified Body No.: 2813 CSA Group Netherlands B.V, Utrechtseweg 310, 6812 AR, Arnhem, Netherlands
Quality Assurance Notification (Module D):	SIRA 05 ATEX M342
Provisions fulfilled by the equipment:	II 2G Ex db IIC T6...T3 Gb II 2D Ex tb IIIC T82°C...T137°C Db IP6X Dust Protection to EN60079-0 / EN60079-31
Standards applied:	EN IEC 60079-0: 2018 EN 60079-1: 2014 EN 60079-31: 2014

## Directive 2014/30/EU: Electromagnetic Compatibility Directive (EMC)

Standards applied:	EN 61000-6-1:2007 EN 61000-6-2:2005 EN 61000-6-3:2007 / A1:2011 / AC: 2012 EN 61000-6-4:2007 / A1: 2011
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## Directive 2011/65/EU: Restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)

The product and all the components contained within it are in accordance with the restriction of the use of hazardous substances in electrical and electronic equipment, including amendment by Directive 2015/863/EU.

## Regulation (EC) 1907/2006: Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)

The product and all the components contained within it are free from substances of very high concern.

## Other Standards and Regulations

EN 60529:1991 / A1:2000 / A2:2013 - Degrees of protection provided by enclosures (IP code) – enclosure rated IP66

# EU Declaration of Conformity



---

On behalf of European Safety Systems Ltd., I declare that, on the date the equipment accompanied by this declaration is placed on the market, the equipment conforms with all technical and regulatory requirements of the above listed directives, regulations and standards.

This Declaration is issued under the sole responsibility of the manufacturer.

A handwritten signature in black ink, appearing to read 'Martin Streetz'.

Martin Streetz  
Quality Assurance Manager

Document No.: DC-070\_Issue\_G  
Date and Place of Issue: London, 03/12/2021



# UKCA Declaration of Conformity



Manufacturer: European Safety Systems Ltd.  
Impress House, Mansell Road, Acton  
London, W3 7QH  
United Kingdom

Equipment Type: STExS1, STExS2, STExL1, STExL2  
STExB2X05, STExB2X10, STExB2X15, STExB2X21  
STExB2LD2, STExB2RT1  
STExC1X05  
STExJ2

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Directive UKSI 2016:1107 (as amended by UKSI 2019:696) – Schedule 3A, Part 1 : Product or Protective System Intended for use in Potentially Explosive Atmospheres (UKCA)

Notified Body for UK type Examination (Module B):	UL International (UK) Ltd Notified Body No.: 0843 Unit 1-3 Horizon Kingsland Business Park, Wade Road, Basingstoke, Hampshire RG24 8AH UK
UK-type Examination Certificate (Module B):	UL21UKEX2019X
Notified Body for Quality Assurance Notification / Conformity to EU-type based on quality assurance of the production process (Module D):	Sira Certification Service Notified Body No.: 0518 Rake Lane, Eccleston, Chester CH4 9JN, UK
Quality Assurance Notification (Module D):	CSAE 22UKQAN0046
Provisions fulfilled by the equipment:	II 2G Ex db IIC T6...T3 Gb II 2D Ex tb IIIC T85°C...T137°C Db IP6X Dust Protection to EN60079-0 / EN60079-31
Standards applied:	EN IEC 60079-0: 2018 EN 60079-1: 2014 EN 60079-31: 2014

Directive 2014/30/EU: Electromagnetic Compatibility Directive (EMC)

Standards applied:	EN 61000-6-1:2007 EN 61000-6-2:2005 EN 61000-6-3:2007 / A1:2011 / AC: 2012 EN 61000-6-4:2007 / A1: 2011
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Directive 2011/65/EU: Restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)

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Regulation (EC) 1907/2006: Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)

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Other Standards and Regulations

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This Declaration is issued under the sole responsibility of the manufacturer.

A handwritten signature in black ink, appearing to read 'Martin Streetz', written over a faint circular stamp.

Martin Streetz  
Quality Assurance Manager

Document No.: DC-100\_Issue\_A  
Date and Place of Issue: London, 24/02/2022