IDEM Safety Switches

UGB-NET-PS

Guard Interlock with Integrated PROFINET/PROFIsafe.

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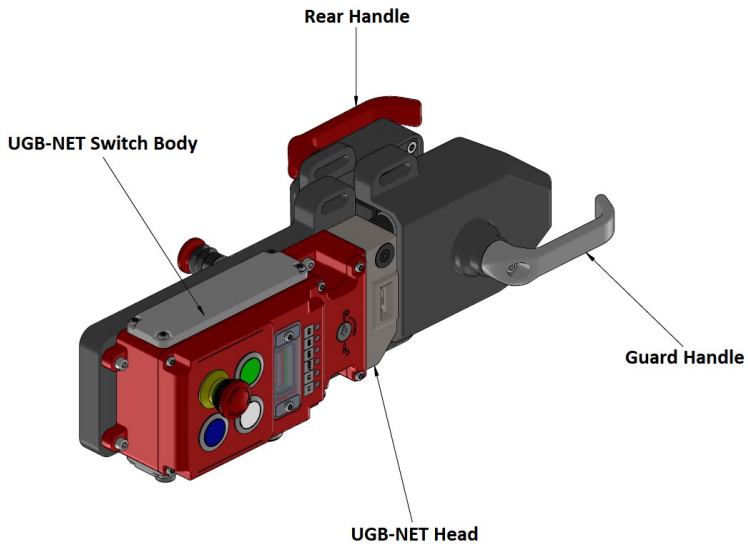
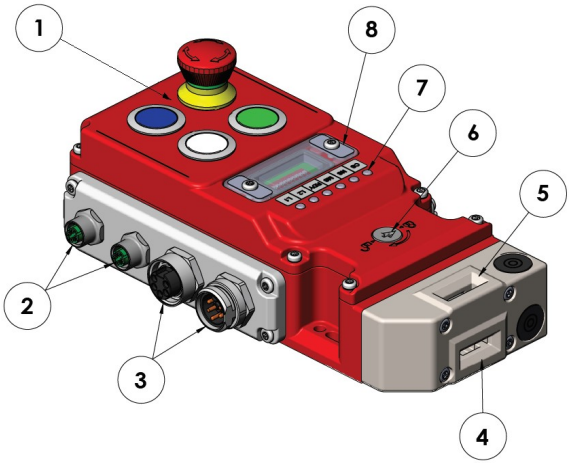
1. System Overview

Rotary handle version shown.

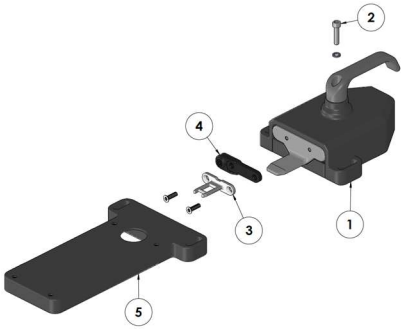


UGB-NET Switch Body



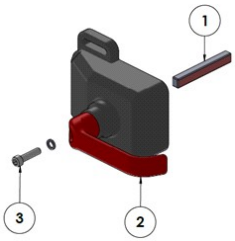
Key
1 – Pilot Devices
2 – Data Ports
3 – Power Ports
4 – Head End Entry
5 – Head Front Entry
6 – Manual Release
7 – Indication LEDs
8 – DIP Switch Cover

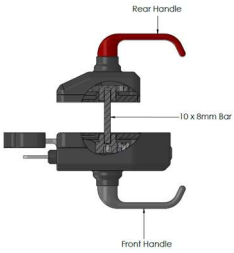
Mounting Plate and Rotary Front Handle



Key
1 – Front Handle
2 – Handle Adjustment Bolt
3 – Actuator Tongue
4 – Actuator RFID Part
5 – UGB-NET Mounting Plate

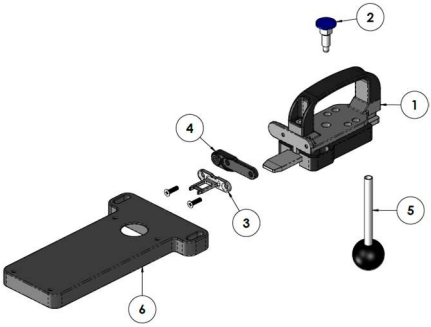
Rear Rotary Handle





Key
1 – 10 x 8mm Bar
2 – Rear Handle
3 – Handle Adjustment Bolt

Sliding Handle



Key
1 – Front Sliding Handle
2 – Spring Loaded Catch
3 – Actuator Tongue
4 – Actuator RFID Part
5 – Read Sliding Handle
6 – UGB-NET Mounting Plate

Rear Release

Rear Release Button

2. Safety Functions

IMPORTANT
- 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 design by IDEM.
- All relevant safety regulations and standards are to be observed.

The UGB-NET-PS complies with the requirements of Cat. 4 / PL e and SIL 3 in accordance with ISO 13849-1, IEC 62061 and IEC 61508. The device implements the following safety functions:

- **Guard interlocking** that complies with the requirements of IEC 60947-5-3 and is classified as a type 4 device with high coding in accordance with the application standard ISO 14119.
- **Guard locking with lock monitoring** for person protection.
- **Emergency stop** function (optional, see part number options)

3. Installation & Maintenance

Principle
The UGB-NET switch is mounted to the fixed frame of the guard or machine, the handle and actuator are fitted to the moving guard with the actuator tongue aligned to the aperture of the switch head. The mechanical tongue actuator profile is designed to match a cam mechanism within the switch head, the cam and tongue together realise the specified holding force.

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

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

- Observe the county-specific regulations when installing the device.
- Repair or modification of the UGB-NET is not allowed unless authorised by IDEM and carried out according to operating guidelines.
- Safety critical failures which do not lead to the safe state shall be reported to IDEM immediately.
- Replace a malfunctioning UGB-NET immediately.

IMPORTANT
- Ensure that the static forces applied during normal operation do not exceed the holding force (Fzh).
- Ensure that dynamic forces acting on the switch caused by bouncing of the guard do not create an impact reaction force which exceeds the holding force (Fzh).

NOTES REGARDING $^{c}(UL)_{us}$ **:**
- Maximum Temperature 40°C

Fastening

IMPORTANT

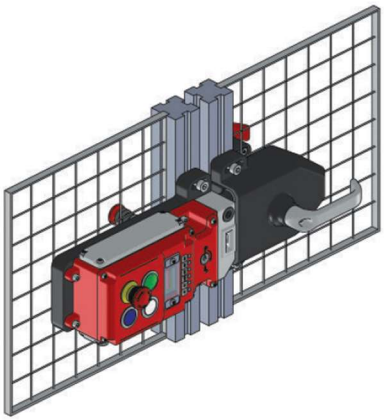
- If fitting rotary or sliding handles ensure the M6 mounting bolts are used to fix the appropriate mounting plates.
- The tightening torque to ensure reliable fixing is 4.0Nm.
- The front and rear rotary handles can be adjusted for desired position by loosening the locking bolt which fixes the handle to the switch body.

Maintenance Activities

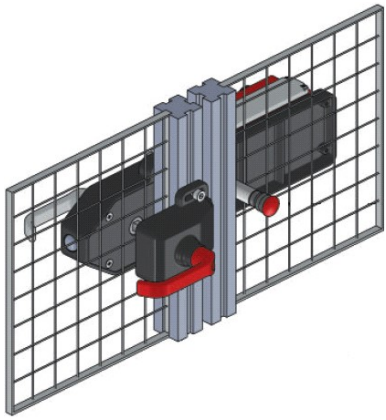
IMPORTANT

- Every month check correct operation of all safe outputs and lock function.
- If any part of the UGB-NET displays mechanical damage then remove and replace.
- IDEM will not accept responsibility for failure of the switch functions if the installation and maintenance requirements shown in this document are not implemented.

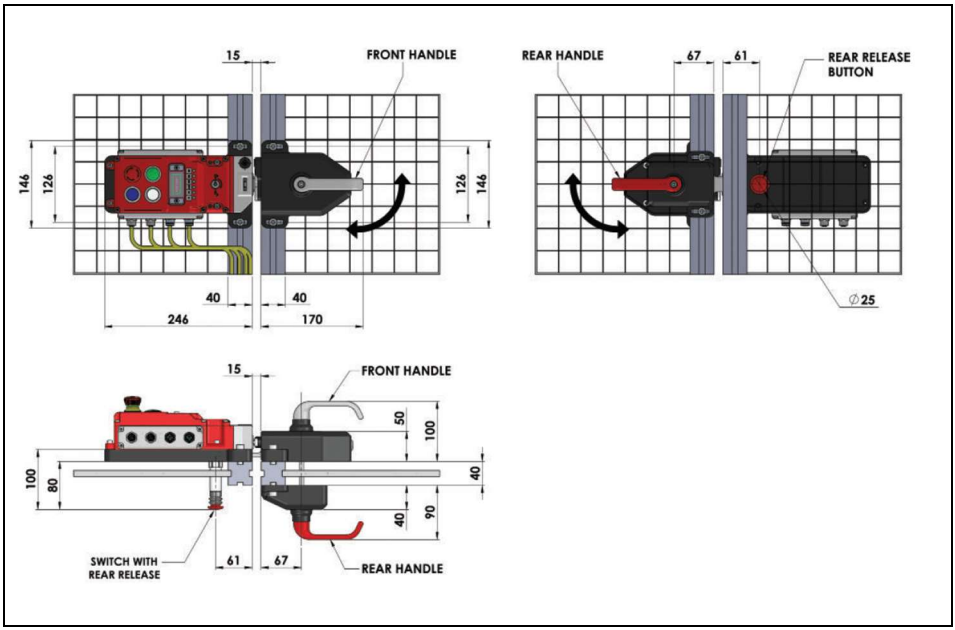
UGB-NET with Rotary Handle



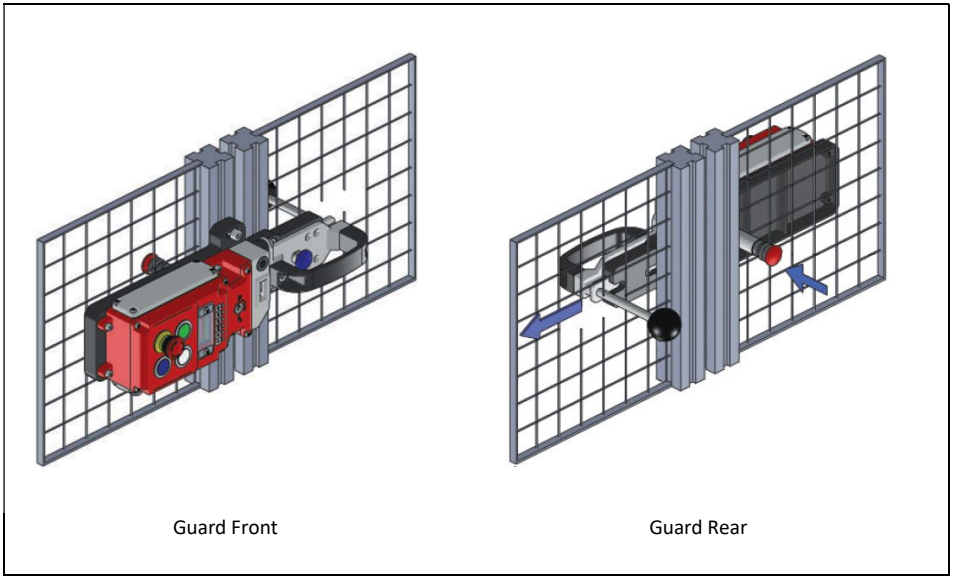
Guard Front



Guard Rear

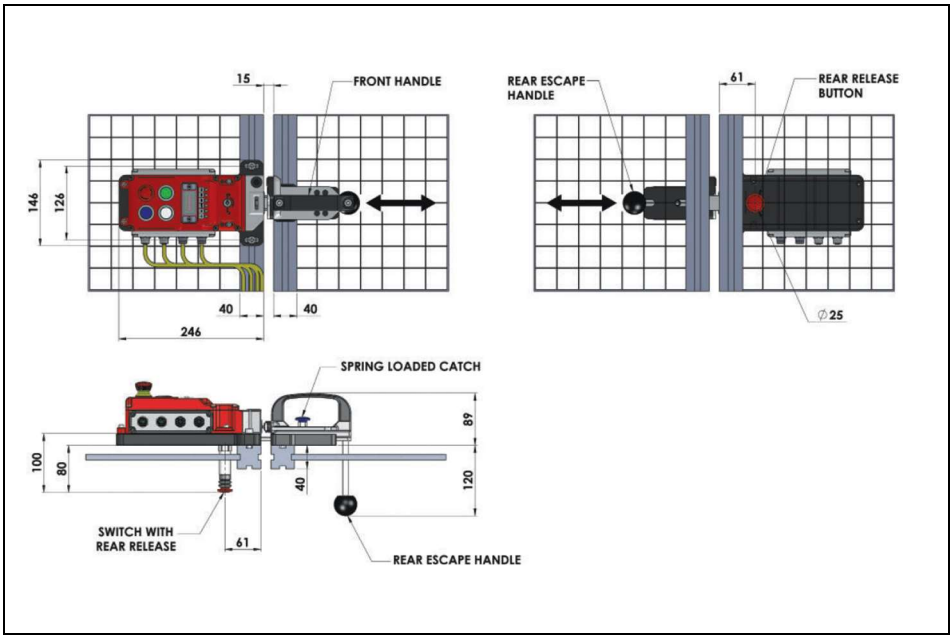


UGB-NET with Sliding Handle



Guard Front

Guard Rear


15
FRONT HANDLE
146
126
40
40
246
REAR ESCAPE HANDLE
61
REAR RELEASE BUTTON
Ø25
SPRING LOADED CATCH
89
100
80
40
120
SWITCH WITH REAR RELEASE
61
REAR ESCAPE HANDLE

4. Controls

Pilot Device Types

All pilot devices can be illuminated, please see PROFINET Outputs, Byte 0.

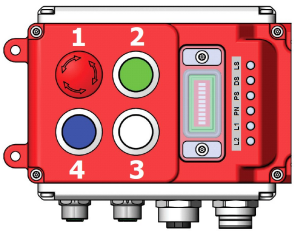
	Button – 1NO Colours – Red, Blue, Green, Yellow, White
	Lamp Colours – Red, Blue, Green, Yellow, White
	Switch – 2 Position ON/OFF.
	E-Stop – Press, twist to release.

Pilot Device Positions

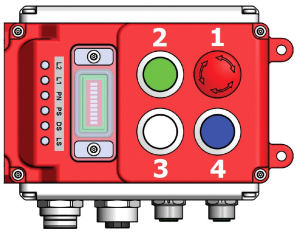
Please see '6. Data Registers' for I/O map.

Example. PROFINET Output, BYTE 0, Bit 0 would illuminate the device in position 1.

The device positions are relative to the device version (right/left).



Right

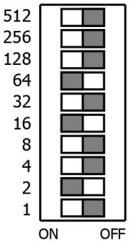


Left

PROFIsafe F-Address assignment using DIP Switch

To adjust the device PROFIsafe 'F-Address' the DIP switches located on the lid of the UGB-NET are used. The following steps can be performed with the device powered on or off, note the final step if the device is powered.

- Locate the DIP switch cover on the UGB-NET body, remove the 2 cover screws to gain access to the DIP switches.
- Using a small tool push the required switches to the 'ON' position to set the corresponding bit.
- The address is given by adding the values of the DIP switches in the ON position.
- The device will accept the new address at next power on or if the switch is powered during these steps, press and hold the reset button until the LEDs turn red then release to reset the device.



INFORMATION

- The example given in the image above shows only switches 2, 16 and 64 set to the 'ON' position. When adding these numbers up the resulting F-Address is 82.

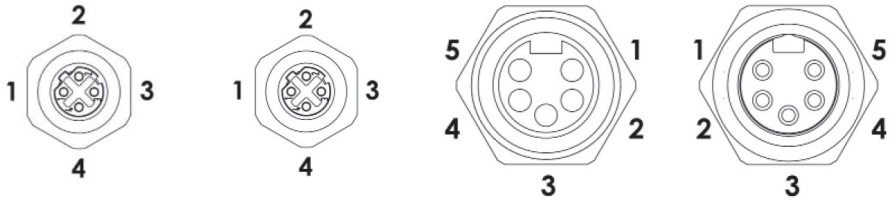
5. Electrical Connection

WARNING
- The device shall be supplied by a 24V SELV/PELV power supply acc. to IEC 61131-2 which limits the maximum voltage in case of failure to 60V.
- Function Earth must be connected.

NOTES REGARDING $^{c}(UL)_{us}$ **:**
- To meet the requirements for UL a class 2 power supply must be used.

INFORMATION
- When multiple devices are used in a daisy-chain arrangement the power bus may be forwarded via the UGB-NET device. Please see technical specification and ensure the total current through each device does not exceed the specified maximum current.

Connector Pinouts



Port A (Link 1)		Port B (Link 2)		Port C (Power)		Port D (Power)	
Female D-Code M12		Female D-Code M12		Female Power 7/8"		Male Power 7/8"	
1	TX+	1	TX+	1	0V	1	0V
2	RX+	2	RX+	2	0V	2	0V
3	TX-	3	TX-	3	Earth	3	Earth
4	RX-	4	RX-	4	+24V	4	+24V
-	-	-	-	5	+24V	5	+24V
				Pins 1 and 2 internally connected. Pins 4 and 5 internally connected. (see information below)			

INFORMATION
- The power supply can be provided by one or both of the available pins for 24V and 0V, Earth must always be used.
- Not all connections are required for all applications, the minimum requirement to operate the device is one data connection and one power connection. All 4 ports are utilised when the UGB-NET is used a 'daisy chain' configuration.

6. Setup

WARNING

- The minimum time between the change of a single safe digital input and the transmission to the safety fieldbus is 6 ms. In case of an input level change at all 6 safe digital inputs at the same time, the maximum safe application reaction time is 16 ms (approx. 2 ms processing time per changed input).
- The maximum operation time (proof-test interval) of the UGB-NET shall not exceed 20 years. When reaching the proof test interval the UGB-NET shall be replaced and put permanently out of order.
- Error bits reported by the UGB-NET via PROFIsafe shall not be used to trigger the safety function of a device or system.
- Only use configuration files provided directly by IDEM.
- After the detection of a safety critical error, the UGB-NET shall not be kept in fail-safe state for more than 1 hour.

INFORMATION

- The device GSDML file can be found via the UGB-NET product page of the IDEM website www.idemsafety.com/products or alternatively please contact technical@idemsafety.com

PROFINET/PROFIsafe Configuration

Download the GSDML file for the UGB-NET and import to application control software.

The following parameters need to be set to make the UGB-NET device available within the control system.

- The device name, default name is 'ugb-net'.
- The device IP assignment method or IP address.
- The PROFIsafe F-Address by adjusting the DIP switches on the lid of the UGB-NET, the F-Address value must match the value set in the application control software.

Once the parameters are set the configuration can be transferred to the UGB-NET.

Device replacement

To replace a device within the PROFINET system first ensure the topology of the system is correctly configured and the PROFINET master can support automatic device replacement. The system does not need to be switched off to perform a device replacement.

1. Remove the existing device, taking note of the DIP switch positions.
2. Copy the DIP switch settings to the new device.
3. Ensure the new device has been factory reset (See 5.3.) and does not contain a device name (new devices are delivered in this state).
4. Connect the replacement device to the same port as its predecessor.
5. Wait while the PROFINET systems finds and configures the replacement device before normal operation is resumed.

Factory reset

Please consult the instruction manual of the application control software or for further assistance please contact technical@idemsafety.com

Actuator replacement/Teach in

	**INFORMATION** • UGB-NET is supplied with a paired actuator, reteach only required if actuator is to be replaced.

If an actuator needs to be replaced the following procedure should be followed while the UGB-NET is powered and connected to the network.

1. Insert the new or replacement actuator into the head of the switch.
2. Set then clear PROFINET Output Byte 2, Bit 0. (R 1 – Guard Reset).
3. The 'LS' LED will flash alternate green/red while the guard resets.
4. Once reset the 'LS' LED will repeat a red double flash.
5. Perform steps 2 and 3 until the 'LS' LED is set to green after reset.

The new or replacement actuator is now uniquely paired with the UGB-NET.

Ensure correct operation of the guard before resuming normal operation.

Functional Tests
Once the device has been installed and setup within the PROFINET/PROFIsafe application control software the following checks are necessary to ensure correct operation of the system.

- Secure mounting of UGB-NET switch and handle.
- Expected operation of all control circuits.
- Guard interlocking, locking and rear escape functions.

7. Data registers

PROFINET (Standard) Inputs

	0	1	2	3	4	5	6	7
BYTE 0	I 1	I 2	I 3	I 4	Reserved.			
BYTE 1	G 1	Reserved.						
BYTE 2	L 1	Reserved.						
BYTE 0								
Bit 0	I 1 - Pilot device (button/switch) state. Enabled (1) / Disabled (0).							
Bit 1	I 2 - Pilot device (button/switch) state. Enabled (1) / Disabled (0).							
Bit 2	I 3 - Pilot device (button/switch) state. Enabled (1) / Disabled (0).							
Bit 3	I 4 - Pilot device (button/switch) state. Enabled (1) / Disabled (0).							
BYTE 1								
Bit 0	G 1 - Guard position state. Guard Open (1) / Guard Closed (0).							
BYTE 2								
Bit 0	L1 - Lock position state. Unlocked (1) / Locked (0).							

PROFINET (Standard) Outputs

	0	1	2	3	4	5	6	7
BYTE 0	O 1	O 2	O 3	O 4	Reserved.			
BYTE 1	S 1	Reserved.						
BYTE 2	R 1	Reserved.						
BYTE 0								
Bit 0	O 1 – Pilot device illumination state. Illuminated (1) / Extinguished (0).							
Bit 1	O 2 – Pilot device illumination state. Illuminated (1) / Extinguished (0).							
Bit 2	O 3 – Pilot device illumination state. Illuminated (1) / Extinguished (0).							
Bit 3	O 4 – Pilot device illumination state. Illuminated (1) / Extinguished (0).							
BYTE 1								
Bit 0	S 1 – Solenoid enable. Energise (1) / De-energise (0).							
BYTE 2								
Bit 0	R 1 – Guard reset. Set to 1 followed by 0 to initiate guard switch reset. See teach-in and fault conditions for further information.							

PROFIsafe (Safe) Inputs

	0	1	2	3	4	5	6	7
BYTE 0	GS 1	GS 2	ES 1	ES 2	Reserved.			
BYTE 1	Q GS 1	Q GS 2	Q ES 1	Q ES 2	Reserved.			
BYTE 2	Reserved.							

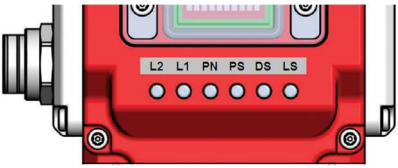
BYTE 0	
Bit 0	GS 1 – Guard switch safe output 1. Guard closed + locked (1) / Other (0).
Bit 1	GS 2 – Guard switch safe output 2. Guard closed + locked (1) / Other (0).
Bit 2	ES 1 – E-Stop safe output 1. E-Stop released (1) / Other (0).
Bit 3	ES 2 – E-Stop safe output 2. E-Stop released (1) / Other (0).
BYTE 1	
Bit 0	Q GS 1 – Qualifier guard switch output 1. Bit GS 1 is valid (1) / invalid (0).
Bit 1	Q GS 2 – Qualifier guard switch output 2. Bit GS 2 is valid (1) / invalid (0).
Bit 2	Q ES 1 – Qualifier E-stop output 1. Bit ES 1 is valid (1) / invalid (0).
Bit 3	Q ES 2 – Qualifier E-stop output 2. Bit ES 2 is valid (1) / invalid (0).

PROFIsafe (Safe) Outputs

	0	1	2	3	4	5	6	7
BYTE 0	Reserved.							
BYTE 1	RS GS 1	RS GS 2	RS ES 1	RS ES 2	Reserved.			
BYTE 2	Reserved.							

BYTE 1	
Bit 0	RS GS 1 – Reset for guard switch output 1. Set to 1 followed by 0 to reset Q GS 1.
Bit 1	RS GS 2 – Reset for guard switch output 2. Set to 1 followed by 0 to reset Q GS 2.
Bit 2	RS ES 1 – Reset for E-stop output 1. Set to 1 followed by 0 to reset Q ES 1.
Bit 3	RS ES 2 – Reset for E-stop output 2. Set to 1 followed by 0 to reset Q ES 2.

8. Diagnostic Indication



LED	Function	Colour
LS	Locking switch state	Red/Green
DS	Device state	Red/Green
PS	PROFIsafe	Red/Green
PN	PROFINET/Network	Red/Green
L1	Link 1	Amber/Green
L2	Link 2	Amber/Green

LED	LED State	Comment
LS	Off	Locking switch inactive, waiting for data connection
	Green	Guard is closed and locked
	Green flash	Guard is closed and unlocked
	Red	Internal fault detected, reset required.
	Red flash	Missing or incorrect RFID tag
	Red double flash	Guard forced open, reset required.
	Red/Green alternate	Reset in progress
DS	Green	Device running
	Red	Internal fault detected
PS	Green	PROFIsafe OK
	Green Flash	PROFIsafe Integration required
	Red	Safe input fault detected, reset qualifier bits
PN	Off	Not initialised
	Green	Normal operation
	Green flash 1Hz	Locate PROFINET device
	Green 1 flash	Diagnostic event present
	Red	Exception
	Red 1 flash	Configuration error
	Red 2 flashes	IP address not set
	Red 3 flashes	Station name not set
	Red 4 flashes	Internal error
L1/L2	Off	No Ethernet link detected
	Amber	Ethernet link detected
	Amber flash	Ethernet data transfer

- Diagnostic LED's are not reliable indicators and cannot be guaranteed to provide accurate information. They should only be used for general diagnostics during commissioning or troubleshooting. Do not attempt to use LEDs as operational indicators.

9. Technical

Device Characteristics

Actuator coding level	Type 4 (RFID), High (acc. to ISO 14119)
Assured sensing distance on (Sao)	10mm
Assured sensing distance off (Sar)	20mm
Assured locking distance	5mm
Response time (E Stop)	36ms max. (E-stop -> transmission to field bus)
Response time (Guard Interlock)	36ms max. (Guard/Lock -> transmission to field bus)

Electrical Data

Operating voltage	24 V DC +10%/-15% (SELV/PELV)
Power Supply UL Requirements	Class 2 power supply must be used.
Current consumption, max.	600 mA (Lock solenoid enabled)
Allowed through current (daisy-chain)	5A

Mechanical Data

Maximum holding force (F1)	3000 N
Rated holding force (Fzh)	2307 N
Body material	Die cast Aluminium
Head material	Stainless steel 316

Environmental Data

Operating temperature	-5°C to 40°C
Enclosure Protection	IP 65
Maximum operating altitude	2000m
Shock and Vibration	Tested in accordance with: IEC 60068-2-6 and IEC 60068-2-27
Pollution Degree (Storage and Operation)	Degree 2 (EN 60664)

Reliability / Safety Data (EN ISO 13849-1)

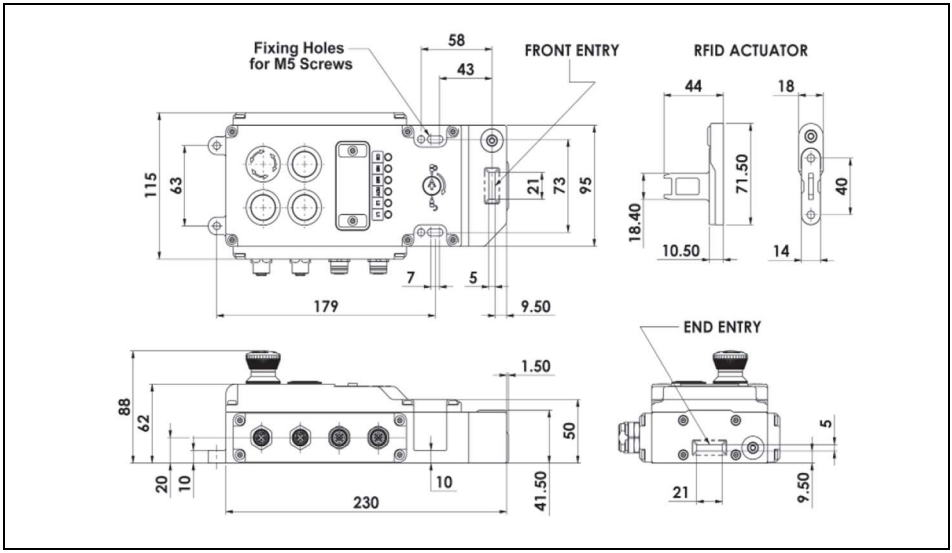
Category	4
Performance Level	e
MTTFd	High
DC	99%

Reliability / Safety Data (EN 62061 / IEC 61508)

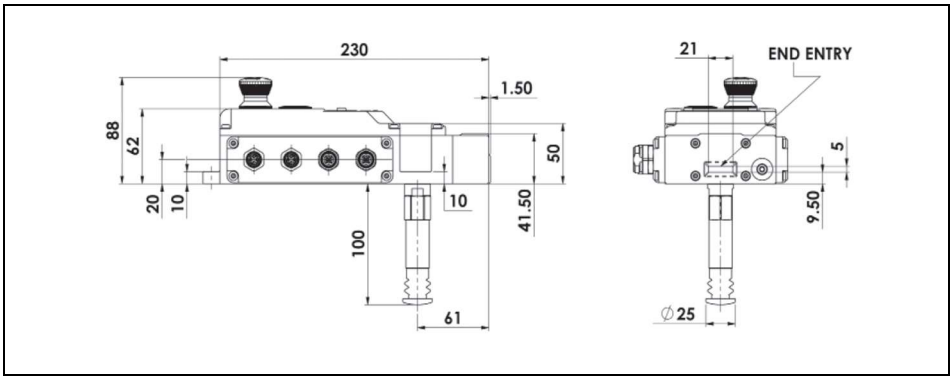
Mission Time	20 years
SIL CL	SIL 3
PFHd (Guard Interlocking / Lock Monitoring)	7.3E-10
PFHd (Emergency Stop Function)	2.3E-9

10. Dimensions

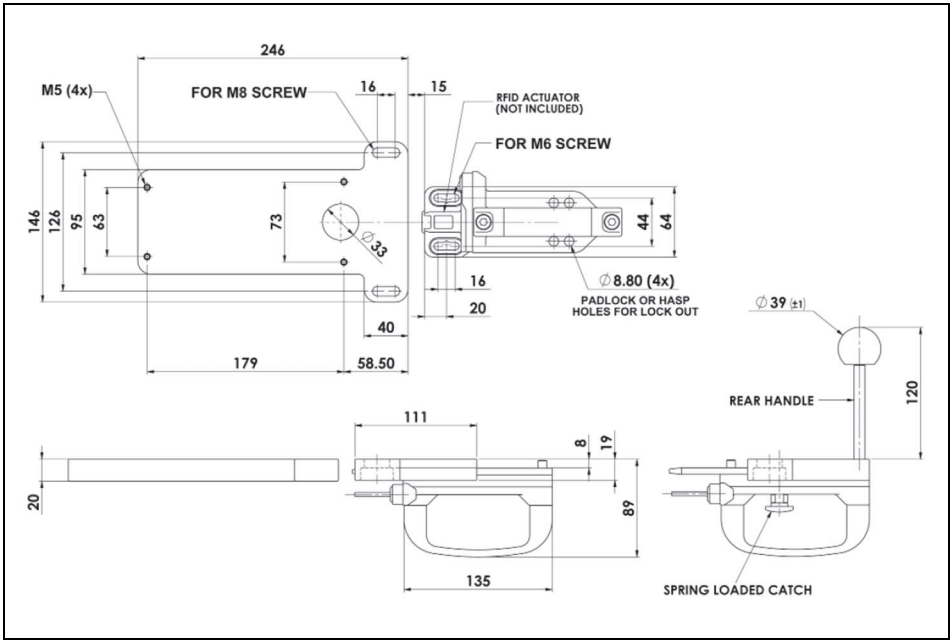
UGB-NET Switch and Actuator



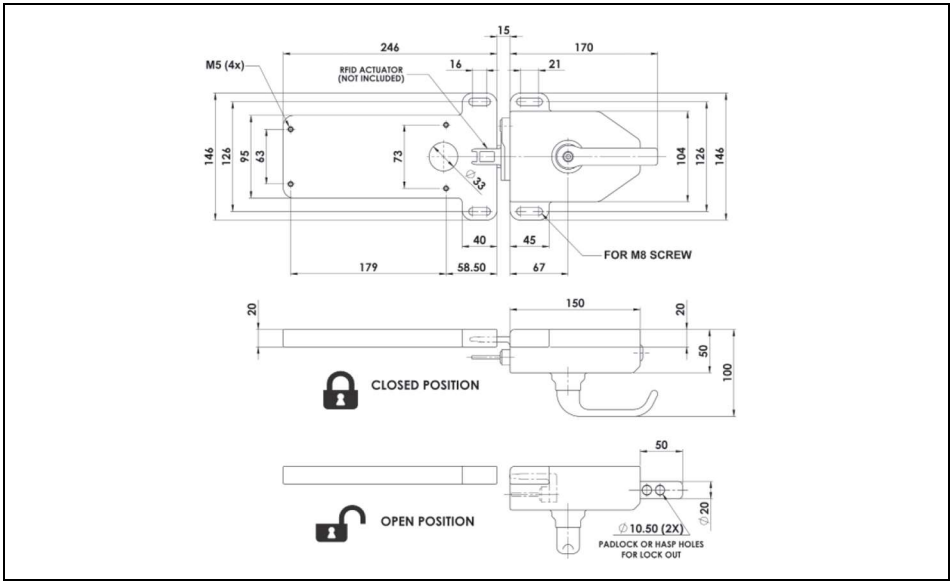
UGB-NET Switch with Rear-Release



UGB-NET Sliding Handle and Mounting Plate



UGB-NET Rotary Handle and Mounting Plate



Notes:

Notes:

Notes:

EC / EU Declaration of Conformity

MANUFACTURER: IDEM SAFETY SWITCHES LIMITED
Hindley Industrial Estate
Hindley Green
Wigan
Lancashire
WN2 4HR
United Kingdom

DEVICE(s): UGB-NET-PS

THE LISTED DEVICES CONFORM TO THE ESSENTIAL HEALTH AND SAFETY REQUIREMENTS OF THE FOLLOWING EUROPEAN DIRECTIVES AND STANDARDS

DIRECTIVES:	Machinery Directive	2006/42/EC
	EMC Directive	2014/30/EC
	Low Voltage Directive	2006/95/EC
STANDARDS:	EN 13849-1	:2015
	EN 13849-2	:2012
	EN 62061	:2015
	EN 61508 (Parts 1-7)	:2010
	EN ISO 14119	:2013
	IEC 60947-5-3	:2013

Third Party Approvals:

TUV Rheinland Industrie Service GmbH
(Notified Body for Machinery, NB 0035)

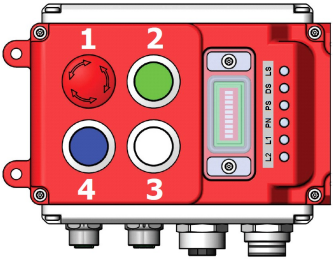
Underwriters Laboratories (UL) File: E258676

M.Mohtasham **Managing Director**
Oct 2020

Manual applicable to following part numbers:

528001 UGB-NET-M-PS, right hand, with manual override.
528002 UGB-NET-M-PS-RR, right hand, with manual override, with rear release.
528003 UGB-NET-M-PS, right hand.
528004 UGB-NET-M-PS-RR, right hand, with rear release.
528251 UGB-NET-M-PS, left hand, with manual override.
528522 UGB-NET-M-PS-RR, left hand, with manual override, with rear release.
528523 UGB-NET-M-PS, left hand.
528524 UGB-NET-M-PS-RR, left hand, with rear release.

Example Part Number: UGB-NET-M-PS, right hand (528003).



Position	Control Device
1	Emergency Stop
2	Red Push Button
3	Green Lamp
4	Selector Switch

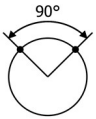
528001 - 1E - 2BR - 3LG - 4S

Switch | Position on Lid | Control Device Code Illuminated Push Button | Lens Colour RED

Emergency Stop	
Contacts: 2NC	
P/N Code	Note
E	Estop can only be fitted into lid position 1

Push Button		
Contacts: 1NO		
P/N Code	Colour Code	Lens Colour
B	R	RED
	B	BLUE
	G	GREEN
	Y	YELLOW
	W	WHITE

Lamps		
P/N Code	Colour Code	Lens Colour
L	R	RED
	B	BLUE
	G	GREEN
	Y	YELLOW
	W	WHITE

Selector Switch	
Contacts: 1NO Maintained	
P/N Code	Description
S	

Blanking Plug	
P/N Code	Description
X	Plastic plug used to seal any unused positions

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