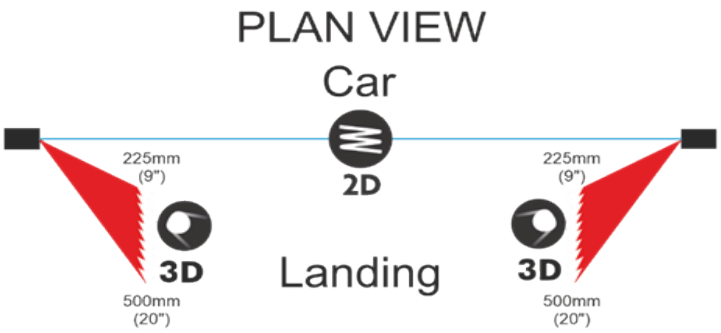
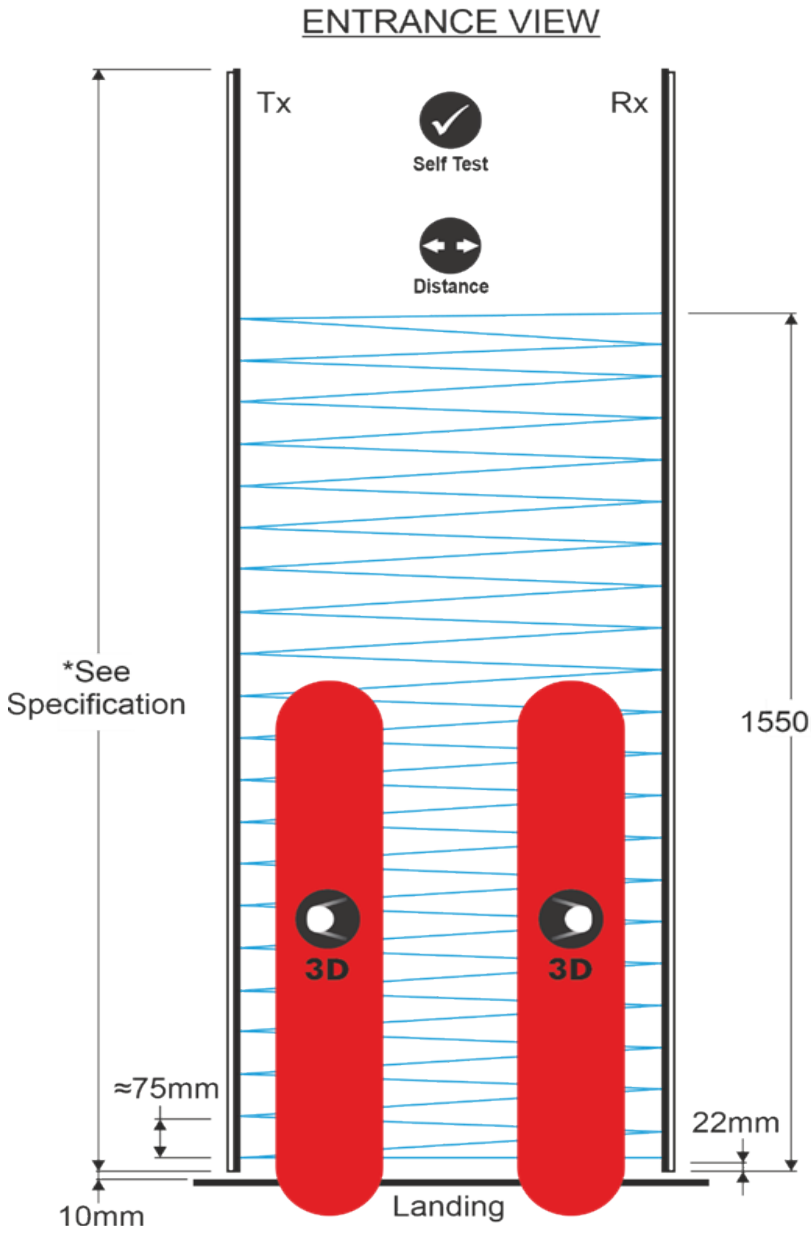
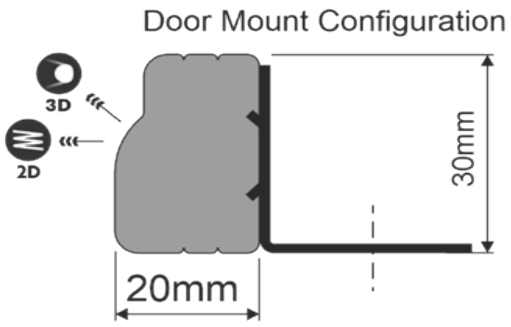
VISION PLUS - FZU 1442US01

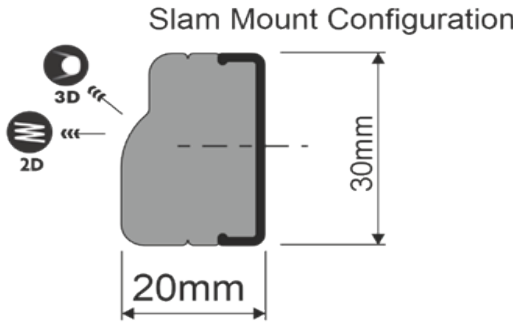
PRODUCT GUIDE & INSTALLATION INSTRUCTIONS

FORMULA-SYSTEMS.COM
SALES@FORMULA-SYSTEMS.COM


PLAN VIEW
Car
2D
225mm
(9")
225mm
(9")
3D
3D
Landing
500mm
(20")
500mm
(20")


ENTRANCE VIEW
Tx
Rx
Self Test
Distance
*See
Specification
1550mm
3D
3D
≈75mm
22mm
10mm
Landing


Door Mount Configuration
3D
2D
30mm
20mm


Slam Mount Configuration
3D
2D
30mm
20mm

INTRODUCTION TO FZU-1442US01

The FZU-1442US01 product is a new elevator door light curtain and combines the recognized standard 2-dimensional curtain with the 3-dimensional function. The design is based on existing architecture. The 2D beam technology has its roots in the FCU-0547 whilst the serial communication protocol used to facilitate the enhanced features has its heritage in the original SafeZone 3D.

This has been upgraded to comply with ASME A17.1-2019/CSA B44-19 that requires the detection of a fully open door which then allows a self-test of both 2D and 3D system functions to be performed before closure of the door.

CORE FEATURES

CONFORMS TO ASME A17.1-2019/B44-19

3D
This is a forward-facing proximity sensor system; 3D has been optimized for both simplicity and effectiveness. 3D provides high-performance detection capability on both sides of the elevator door independently. Using a combination of 3D optical sensor on each edge side (transmitter/Receiver), the 3D system optimizes target detection to meet the object size and color specified with in the ASME code.

2D
Based around the Formula System 2D interleaved technology system, it comprises of 22 sensors spaced at 75mm apart to allow the detection of all object sizes over the height requirements specified in the ASME code.

DOOR DISTANCE FULLY OPEN DETECTION
To meet the ASME code requirements, detection of when the door is fully open is required. The detection of this point is carried out using distance related to time. This will occur at 500mm and above.

SELF-TEST
On detection of the open door, the FZU-1442US01 will carry out a test on both 2D and 3D functions, reporting back if failure occurs through either the communication line on the unit and output drive.

CONNECTIVITY
As with previous Formula Systems products the FZU-1442US01 is a 'controller-less, direct-connect' design, suitable for direct integration with most door operators and controllers.
(Depending on model)

Basic connectivity simply requires a suitable low voltage supply (18-30v DC) and produces an NPN (normally closed) control signal input switched to ground.

The FZU-1442US01 can be connected to the existing FPS 0270 - 274 Formula Systems universal interfaces using the FEXT0032 making them retrofit to an FCU-0547 installation an easy installation upgrade step.

ECO-MODE
Formula Systems have incorporated a simple energy-saving feature in this 3D product range. By reducing the number of active beam paths when the doors are closed power consumption is reduced by 30%. When the door open, the system senses the change and returns the system to full detection capability.

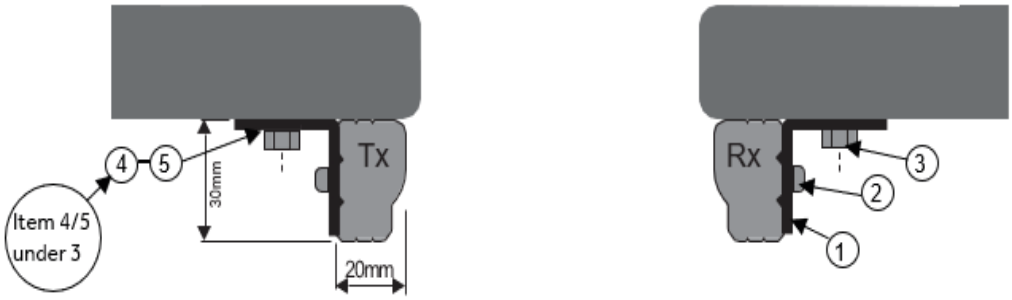
INSTALLATION INSRUCTIONS

The installation kit includes the following list of parts, the part item number is also referenced to in the two possible different mountings:

	ITEM	QUANTITY	USAGE
1.	Bracket Door Mount	10	Bracket on door
2.	Screw M3 x 6 Pan PZ	10	Bracket on edge
3.	Screw 4.8 x 13 Hex Washer Self Drill	14	Bracket to door & cable retainer
4.	Washer M4 Plain	14	Bracket to door & cable retainer
5.	Washer M4 External Toothed Locked	14	Bracket to door & cable retainer
6.	Cable Retainer	2	Fitted to door
7.	Cable Extension	1	Extends cable (side opening)
8.	Drill 3.6mm HSS S/S Jobber	1	
9.	Slam Mount Extrusion	1	
10.	Screw No 6 x 10 Flange PZ	3	Slam mount extrusion fitting
11.	P Clip Size 7.9 Natural White	10	
12.	Spacer Block	1	Edge location from floor

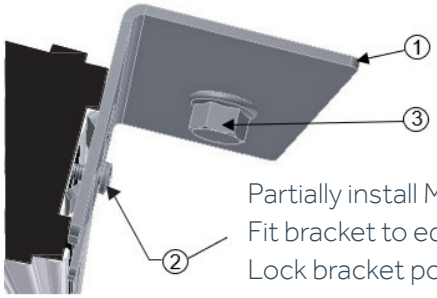
CENTRE OPENING MOUNTING

Unlike a simple 2D system the 3D edge is handed, the TX and RX must be installed (shown in the diagram below) with the Tx on the left-hand side when facing into the car and the lens profiles curved toward the landing to facilitate good transmission angles for FZU-1442US01 3D features.



Install the TX and RX edges onto the doors using the mounting brackets on each edge spaced at regular intervals or as convenient if existing hole positions exist.

The brackets slide into the channel from the top. Slide in all 5 before beginning to position, secure and tighten fixings.



Partially install M3 x 6mm thread forming screw to bracket.
Fit bracket to edge and position.
Lock bracket position using jacking screw (as shown).

SIDE OPENING MOUNTING

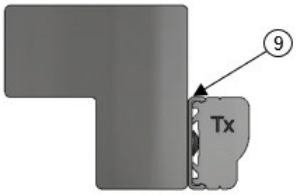
The light curtain now has a simple snap-in clip extrusion for static slam positioning.

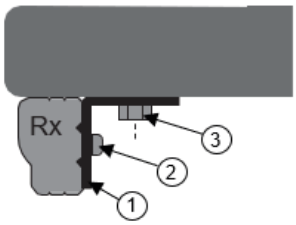
Mark the slam using the edge on the door as a guide to ensure the slam unit is as well aligned as possible to the unit on the door anything that looks aligned to the eye will be satisfactory with 6mm offset in any direction being a practical preferred limit.

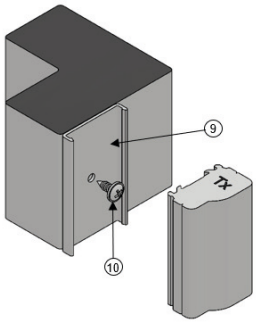
Secure the plastic slam extrusion at points ¼, ½ and ¾ along its length using the flanged pozidrive screws along a centre line of the piece (the ends will be secured later).

Press the respective edge into the extrusion, starting at one end (the bottom is easiest) and working along until the edge is fully snapped in (a second pass may be required to ensure all points are fully home).

To complete a secure installation, it is recommended to then remove the lens cover of the edge and secure at top and bottom mounting points with the screws provided noting these are only two mounting points provided for this. Please only use these.

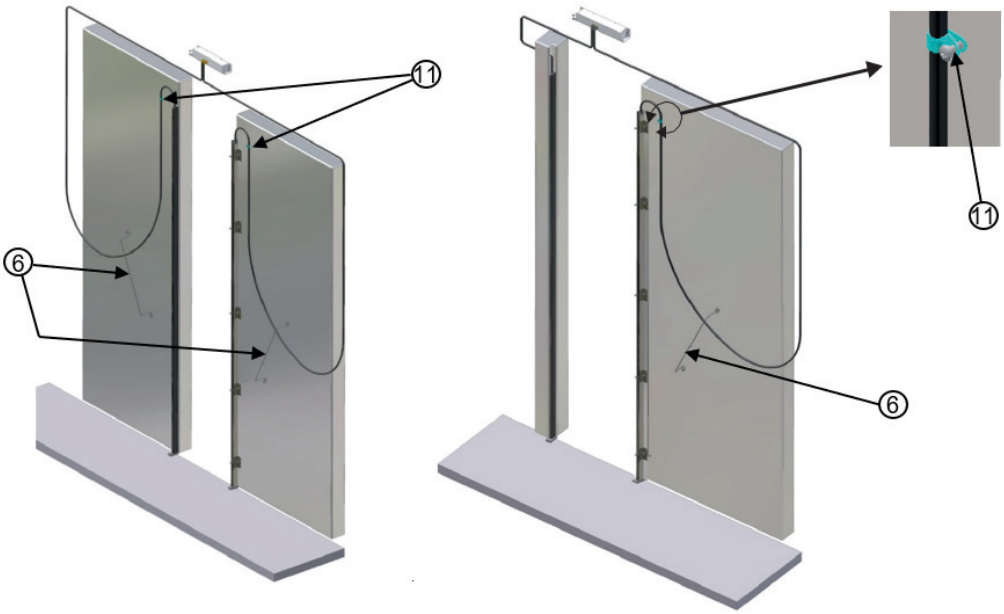






CORD ROUTING

Correct cord routing is essential for long service life and trouble-free operation. The cord must be installed such that all bending during door movement happens in the 'hanging loop' and not at the anchor points. See below and note 'P' clips used to secure cord.



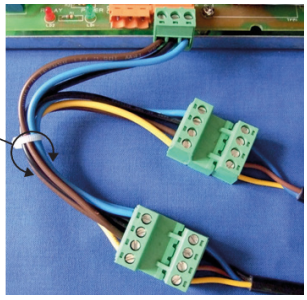
CONNECTIONS

Conductor colors are:

Brown - 24V (18-30v)
Blue - Common (Connected internally to ground)
Black - Signal output (NPN normally closed)
Yellow - Data (links RX to Tx)

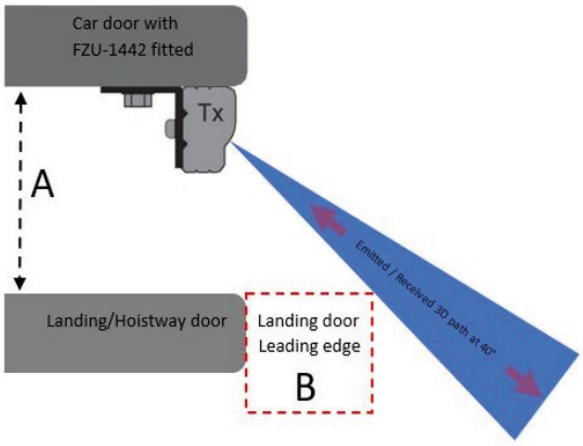
For connection to a standard FPS unit using an optional cable assembly (see right).

Optional cable assembly (FEXT0032)



CAR TO HOISTWAY / LANDING DOOR CLEARANCE

The FZU-1442 product has been designed to greatly remove the issue of both false detections occurring on the 3D system and total blockage of the 3D system when the landing door is leading in front of the car door. There are however some installation dimensions to consider when it comes to the fitting of the product to keep within the product design in relation to the distance that the landing door can lead in front of the car door.



The landing door leading edge, point B can be calculated from the car to landing door distance, point A and the 3D emitted/ received angle of 40°.

Using the formula: B = A* tan (40)

So, with a car to landing door distance of 100mm we will get a landing door leading edge distance (point B) of 67mm. (2.6")

There has also been added a 15mm tolerance on this calculation. (A reduced by 15mm)

Table below is for reference and shows the calculation for various Car to Landing door distances including the tolerance as stated above.

ALL ARE SPECIFIED IN MM		RESULT IN INCHES	NOTES
Car to landing door distance (Point A)	Landing door leading distance (Point B)		
30	12.6	0.5	Not practical, no clearance between the mounted product and landing door.
40	21.0	0.8	*With no tolerance added to Point A, Point B would be 33.6mm (1.5"). This would then allow 10mm clearance distance between the landing door and fitted FZU-1442.*
50	29.4	1.2	
60	37.8	1.5	
70	46.2	1.8	
80	54.5	2.1	
90	62.9	2.5	
100	71.3	2.8	This is the maximum distance allowed under ASME A17.1-2019

ASME A17.1-2019 states that the allowable maximum landing door leading edge distance is 19mm. The table show that the 19mm can be met at any distance >40mm between car and landing door, this also allowing for 15mm tolerance.

FUNCTIONAL TESTING

With both transmitter (TX) and receiver (RX) units installed, switch on the power.

With no object present in either the 2D beam path or within the entrance of the car, the system will go into a non-Detection state. (No RED LEDs illuminated on either TX or RX units)

AT THIS POINT, IF EITHER TX OR RX RED LEDS ARE ILLUMINATED OR OUTPUT IS IN A DETECTION STATE, THEN PLEASE REFER TO THE SECTION ON TROUBLESHOOTING.

FUNCTIONAL COMMISSIONING AGAINST CODE REQUIREMENTS:

Below points, 1, 2 are with the doors parked in the fully open position, point 3 are for manually moved doors and point 4 is when the door is placed back into full operational mode.

1. CONFIRM 2D BEAMS ARE FUNCTIONING:

- Please make sure no person or objects are present in the entrance to the car.
- From within the car to prevent possible 3D triggering, obstruct the 2D beam using hand.
- If the edge detects the obstruction, the RED LED on the RX edge will illuminate, and output will be triggered.

2. CONFIRM 3D DETECTION IS FUNCTIONING:

- Confirm that the system is in a non-detection state before test, no RED LEDs are illuminated on either transmitter or receiver unit.
- Now approach the doors, when at between 20" – 9" detection should occur. This is seen by looking for the RED LED on the RX that will illuminate and detection output will be triggered.
- Refer to appendix A for an illustration of the detection area from the door.

Note: This RED LED will stay illuminated for 5 seconds unless the 2D systems has a detection occurrence event. If no detection is seen on the 2D system, then the 3D will then stop detecting.

If point 1 and 2 are confirmed to be functioning correctly, the doors can be manually moved towards the closing point.

3. CONFIRM 3D DE-ACTIVATION IS FUNCTIONING:

- With the doors at an approximately 18" apart, the 3D with be deactivated.
- If the tests at point 2 are now tested the unit should not show detection.
- Another test to confirm 3D has been deactivated, after a time of 7 seconds the 2D will also stop detecting when an object is in the 2D beams path. (System has now entered ECO mode state)

4. CONFIRM 3D SELF-TEST IS FUNCTIONING:

- Place the door in full operation mode.
- Allow the door to close and then open a couple of times.
- Without causing a detection to occur, observer the RED LED on either of the transmitter of receiver units.
- On the door opening cycle and once the door has reached the fully open position, both RED LEDs will flash to indicate that a self-test has occurred. This will not cause a detection output to occur.
- With door in full operation mode, confirm 3D and 2D object detection occur and door retraction is also observed.

TROUBLESHOOTING

FIRST BASIC CHECKS TO CONFIRM:

A. DC POWER – A quick way to confirm is to verify that GREEN LEDs are illuminated on both units. If not present on both TX and RX units then no DC power is present. Both must be illuminated.

B. DATA CONNECTION – The data connection (yellow wire) between RX and TX edge must also be connected to each other for correct operation. If not connected the system will not work.

C. ORIENTATION – Although unlikely, it is possible to install the edges with both facing into the car rather than out towards the landing. The correct location for each unit is: TX left , RX right car door when looking from the landing entrance into the car.

D. SIDE/SLAM MOUNTING – Please confirm that only the 2 provided mounting holes have been used for side mounting. If additional mounting points have be added, then damage to the unit is probably and replacement will need to be acquired.

E. DOOR/UNIT DISTANCE – Is the distance between the door/units greater than 70°. If they are then they are outside the requirement of the ASME code that specifies 60°.

If the above five point are all confirm to be correct and RED LED illumination is still seen on either TX or RX units, then the following in the order shown should be used to resolve any further issues.

Note: It is best practice to perform the following with the doors parked in the fully open position to prevent confusion. (Not in full operational mode)

RED LED ILLUMINATED:

This could be caused by 3 reasons, 3D in detection on either TX or RX or 2D is not functioning. To eliminate possible causes, a simple first test is to turn OFF the 3D sensors on both TX and RX units.

This is carried out using a DIP switch located towards the top inside of each unit under the lens filter. Refer to Appendix B. Turn OFF switch 2 on both TX and RX units, this will disable the 3D.

With both these switches OFF, now check if the illuminated RED LEDs have now turned OFF.

- If the RED LEDs are OFF, the system should now work in 2D function only.
  If 2D function is confirmed to be working, then go to 3D detection system below.

- If the RED LED on the receiver unit is still illuminated, then the issue is with the 2D.
  Please again confirm points A-E at the start of this section.

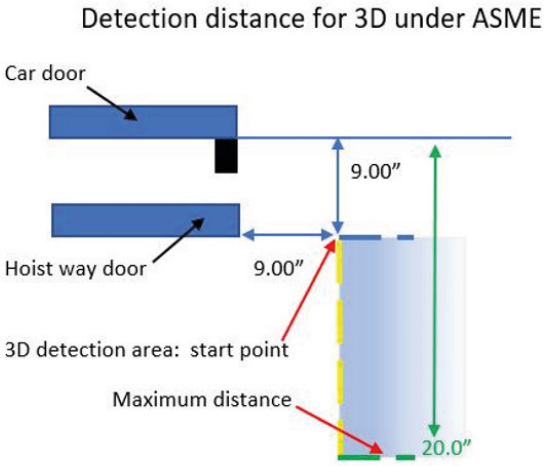
3D DETECTION SYSTEM:

The system is now confirmed to be working in 2D mode with no lens fitted but there was on first start an issue when the 3D is enabled. The next step is to determine which 3D system is causing the issue - TX or RX. (This can be first performed with no lens fitted)

- Now in turn, switch back on the 3D, first on the TX and then on the RX. If switching back on the 3D on TX causes RED LED illumination, a detection state, then turn the 3D on TX OFF and try turning on the RX 3D.
- If with either TX or RX 3D enabled, the RED LED illuminates on the RX unit, detection state, then please confirm again points A-E at the start of this section are correct.
- If enabling the 3D on either TX or RX will not cause the RED LED to illuminate on the RX unit. Then check Lens filter for any contaminants, (either in or outside the lens) tape, paint etc. if present remove/clean, then with the 3D enabled on both TX and RX, refit the lens filter to each unit in turn to see if the issue is resolve.
- If with the lens filter fitted the system is now showing RED LED illumination on the RX unit only. Then switch OFF switch 2 on the RX unit to confirm the 3D is not the cause.
- If with RX switch 2 OFF, RED LED is illuminated on the RX unit, then 2D is the cause, please confirm points A-E at the start of this section.

You should now have a functioning unit that can now be tested to confirm the Function against code requirements, Refer to Functional commissioning against code requirements section of this document.

APPENDIX A



Only shown in the diagram to the right for the TX unit, (Left side of elevator) but same distance criteria is applied to RX unit. (Right side of elevator)

APPENDIX B

Default factory settings for the FZU-1442US01 Transmitter and Receiver units are 2D and 3D systems active. There are other setting options that can be set using the DIP switch on each unit. The DIP switch setting are different depending on the unit, TX, or RX. Please see below configuration.

DIP SWITCH SETTING TX UNIT	**FUNCTION**
Selector 1 (ON)	No function *(Default Factory)
Selector 1 (OFF)	No function
Selector 2 (ON)	3D System Active *(Default Factory)
Selector 2 (OFF)	3D System Non-active

DIP SWITCH SETTING RX UNIT	**FUNCTION**
Selector 1 (ON)	5 second delay on 3D activation *(Default Factory)
Selector 1 (OFF)	5 second delay not active. (Not comply to ASME if OFF)
Selector 2 (ON)	3D System Active *(Default Factory)

2D system is permanently active and cannot be deactivated.

The DIP switch is located inside each unit under the front lens filter.

To access the switches to configure the FZU-1442US01, remove one or both lens filters from the front of the TX and RX edge. This is best achieved by prising free one top corner.

NOTES

INNOVATORS AND MANUFACTURERS OF ELEVATOR DOOR PROTECTION SYSTEMS

FORMULA SYSTEMS
Technology House,
Oakfield Industrial Estate,
Eynsham Oxfordshire OX29 4AQ UK

T: +44 1865 882330
E: sales@formula-systems.com

FORMULA SYSTEMS NORTH AMERICA
2300 Eastern Avenue,
Elk Grove Village,
Illinois 60007, USA

T: +1 847 350 0655
Toll-Free: +1 866 952 9200