Fiber Optic
Perimeter Intrusion Detection System
(FO-PIDS)

Fiber Optic Sensing Solutions Private Limited

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ABOUT US

Fiber Optic Sensing Solutions Pvt. Ltd. is a manufacturer of Fiber Optic Sensing Technology products and solutions based on Distributed Acoustic Sensing (DAS) for Perimeter security and surveillance. Our products include a range of fiber optic sensing devices and alarm management software, all manufactured under brand FOSS. Fiber Optic Sensing Solutions provides a fiber optic sensor that simplifies the process of threat detection, reporting and monitoring, enabling the security agencies to take preemptive countermeasures against the intruder. Industry knowledge and expertise across a broad range of sensing technologies have allowed FOSS to innovate, research, engineer and manufacture advanced security solution.

Typical applications of FO-PIDS are in Homeland Security (HLS), Cross-country borders, Airports, Oil Refineries, Critical Infrastructure, prisons, sensitive industrial installations, protection of VIP premises, Armament depots etc, to name a few. FO-PIDS will provide intrusion Detection and location to alert securities agencies/control room in advance so that preventive measures can be initiated to avoid any security breach.

As a growing Fiber optic sensing solution company, we deliver a complete functional solution for the physical security of various assets. Major security breaches such as third party intrusion, Fence tampering etc can be detected and addressed using our solution. FO-PIDS can be seamlessly integrated with third party devices such as hooters, flood lights, cameras etc.

GROUP COMPANY

Fiber Optic Sensing Solutions Private Limited is a subsidiary of TVS Sensing Solutions Private Limited. TVS Sensing Solutions offers value-added solutions to industrial, consumer durable, automotive, IT Segments besides offering quality precision micro switches and application support to our customers, from our manufacturing facility in Madurai. TVS Sensing Solutions has emerged as a key player in Sensor Products and Solutions that serves Automotive, Industrial and Appliance markets in stand alone products and in IoT products. TVS Sensing Solutions also serves the end to end solutions of IIOT through ecosystem partnerships.

To learn more visit: https://tvsss.co.in/

CONCEPT EXPLANATION

Fiber Optic Perimeter Intrusion Detection System (FO-PIDS)

FO-PIDS systems are intrusion detection sensor systems developed for advanced perimeter security. Optical fiber advantages like passive nature, immunity to Electromagnetic Interference, easy to repair makes FO-PIDS systems quite robust, relevant and useful in the security and surveillance industry. FO-PIDS deployment follows a Zone based deployment which makes monitoring easier and effective.

How It Works?

A modern surveillance technology where optical fiber is the sensor element, giving it a distributed sensing properties. The FO-PIDS main device sends optical signals and receives it back with changes introduced into it due to the surrounding intrusion signals. These signals are processed using intelligent algorithm. Intrusion alarms and warnings are generated alerting the authorities concerned regarding the intrusion occurrence event and its location in the relevant protected area.

PRODUCT FEATURES

Perimeter Intrusion Detection

Perimeter or boundaries of assets to be protected are trespassed by intruders or smugglers avoiding the human surveillance eyes. To protect from these intrusions FO-PIDS is a smart solution which monitors and captures all kind of physical activity going on near the boundaries by capturing vibration signals.

Passive Sensor

Since all components are passive in nature, these don't require any electrical power to the outdoor components. Because of this, the system is immune to electromagnetic interference (EMI), radio frequency interference (RFI), and lightning.

Zone Based System

A perimeter is segregated into different detection zones, deployed with several sets of sensing fiber. FO-PIDS system can set individual zones for close monitoring and threat resolution.

Distributed Acoustic sensing

Optical Fiber is used as the sensing element which can be deployed, making the sensor properties distributed in nature.

Real Time Alert and Warning

Fast and immediate sensing capability, and alert and warning systems in hardware and software.

Overground and Underground deployment

Deployment of FO-PIDS can be done in overground boundaries like different kind of fences, walls which are already a physical barrier and underground deployment over the length of perimeters or along the walls in the ground and similar areas where visibility of the FO-PIDS sensor fiber is not preferred.

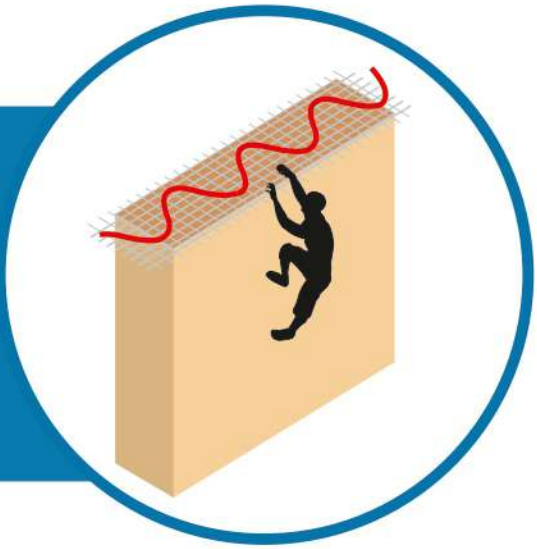
Intelligent software control of device and zones

Management software control for the device operation, zone management, alarm indication and warning system which has intelligence facility to tune itself for fluctuating environmental and surrounding situations.

DEPLOYMENT

1. Over ground

Overground installations are concentrated majorly on already available physical barriers like fences and walls. Fences like iron wire net, metal wire net, barbed designs are chosen for over ground fence applications. For walls, deployment is done on the surface and top of the walls for better intrusion detections.

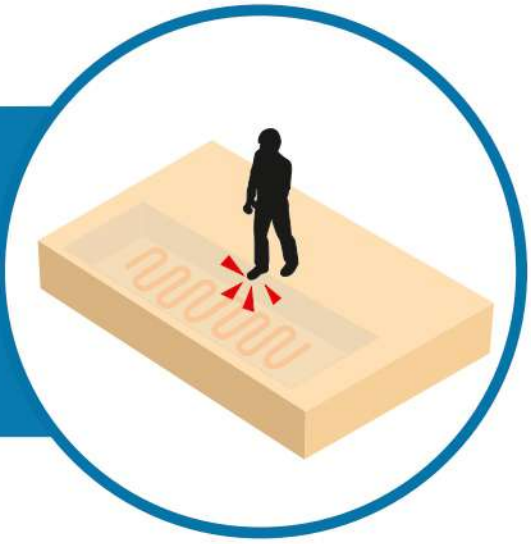


Intrusion behaviors detected:

- Climbing the fence or wall
- Climbing the post of the fence or climbing wall
- Climbing the fence/wall by stepladder
- Tearing down and lifting the fence
- Digging tunnel beneath the fence/wall
- Dissembling the fence
- Dissembling the alarm host
- Cutting the Fiber
- Cutting the fence

2. Underground

In a buried underground application, vibration and pressure changes are the primary modes of stimuli. To make the surface more sensitive to the intrusion detection, underground soil is modified by adding suitable concrete mixture.



Intrusion behaviors detected:

- Digging and tunneling activities
- Running and fast walking
- Vehicle passing
- Tree cutting

FOPIDS MAIN ATTRIBUTES

Centralised Alarm Management Software main attributes:

Alerts/warnings		Administrator functions	
No Intrusion	Tamper Alarm	Zone Deployment	Zone Identification
Intrusion Alarm	Power Off Alarm	Alarm Logs	Joint Action Alarms
Fiber Break alarm	Joint action Alarm	Alarm Processing	Statistics Report

FO-PIDS DEVICES AND MANAGEMENT SOFTWARE

It can control 2 to 16 zones using a single device. It has a rack mountable design suitable for a control room facility. All the monitoring facilities can be integrated like an alarm unit, management unit and any other security layer necessary to be integrated with the system. A plug in card system is used in the device providing easy maintenance and redundancy feature.

SYSTEM CHARACTERISTICS

- The system senses changes as motion, vibration, and pressure. These changes are received and processed by the intelligent algorithm designs inside the device along with management software.
- FO-PIDS system is equipped with NO/NC dry contacts which enables a wide range of security equipments to link up with our system. Upon triggering a TAMPER or INTRUDER signal, the FO-PIDS communication and monitoring unit will trigger the NO/ NC contacts to perform its respective task. It can also be connected to external alarm units or surveillance mechanisms.
- Large perimeters with the same landscape and environment conditions are the challenges during FO-PIDS deployment. The perimeter can be segregated into as many zones as desired, but each should not exceed 100 to 250 meters for both over ground and underground installation. Several zones can be integrated into a single hardware device and will be managed by single management software.
- Facility of an LCD display to monitor change in source and receiver settings in the device.
- Device management and monitoring through TCP/IP Ethernet connectivity. Through Ethernet, Centralised Alarm Management Software can manage as many devices as required. Zone configuration, mapping, real time monitoring, records through Centralised Alarm Management Software. Integrating several projects in one single management software.

SELECTION GUIDE

Device	Description	Image
safeFENCE™	2 Zone Device	
safeMAX™	Multi Zone Device (4 to 16 zones)	
	Multi zone Device with Camera Integration.	

DataSheet

FIBER OPTIC PERIMETER INTRUSION DETECTION SYSTEM[TWO ZONE]

Features:

- 15.6 inch capacitive touch screen
- Optical connectors: FC/APC
- Two zone device
- Stand-alone unit
- 4GB, Windows 10 integrated embedded system

safe FENCE

OPTICAL INTERFACE	
Connector	FC/APC
Launched power for z1&z2	+3 to 5.5 dBm
Wavelength	1550nm
Receive sensitivity	-20(dBm)

ALARM OUTPUT INTERFACE	
Output type	Contact closure output
Connector	phoenix terminal
Output number	2
Alarm responding time	<3 sec
Alarm relay time	From 1 sec~10sec, the default is 3 sec.
Relay contact rating	1A 30 V DC 0.5A 125 V AC

ETHERNET COMMUNICATION INTERFACE(EMU)	
Connector	RJ45
Bit rate	10 Mb/s or 100 Mb/s auto negotiation

CONSOLE INTERFACE	
Connector	RJ45
Baud rate	19200 bps
bits	8
Stop bit	1
parity check	None

POWER REQUIREMENTS	
Power supply	AC 230V /+12VDC
DC power input range	-36-72V DC
AC power input range	176-264 V
Power consumption	30W±10%
Surge protection	500 V
Mean time between failures	100000 hours

ENVIRONMENT	
Working temperature	-40~70°C
Relative Humidity	≤95%, no condensation
Storage temperature	-40~70°C
Host dimension	400mm x 250mm x 60mm

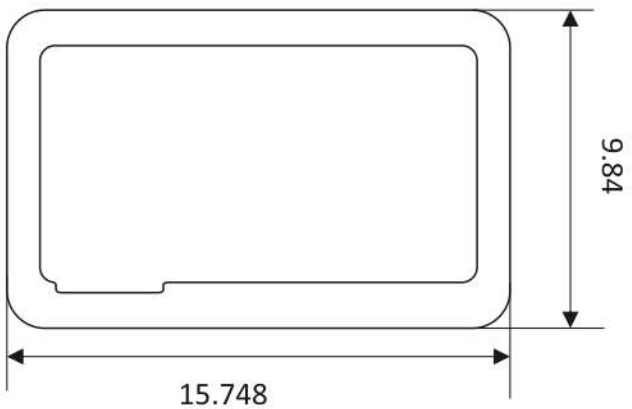
DataSheet

ALARM INDICATORS	DESCRIPTION		
RUN	Running indicator: green	Blink: Running normally	ON/OFF: Running abnormally
ALM1 & ALM2	Alarm indicator of zone#1&2, red. ON: The fiber is broken. ON for 3sec: intrusion or tamper alarm. OFF: No alarm. Note: the alarm relay time can be configured from 1sec~10sec, the default is 3sec.		
Voice Alarm	Siren sound using buzzer/voice descriptions for each type of alarm in software		

Alarm terminal for zone#1 & zone#2	CONTACT CLOSURE OUTPUT INTERFACE FOR ZONE#1 TO ZONE#2, ADOPTS PHOENIX TERMINAL		
	NC	Normally closed, it will be open when alarm triggers.	Note: No alarm: NC is closed, NO is open. Power down or fiber broken alarm: NC is open for long time, NO is closed for long time.
	COM	Common terminal	
	NO	Normally open, it will be closed when alarm triggers.	

SOFTWARE SPECIFICATIONS: Centralised Alarm Management Software

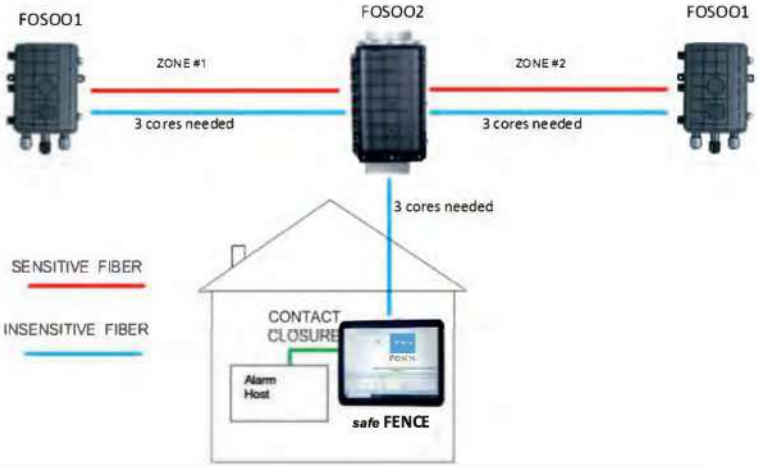
Device Interface	TCP/IP- http web interface		
Device Interface port	Ethernet port- RJ45 connector		
Alert information updates	1. Date of alarm	2. Time of Alarm	
	3. Zone of Alarm	4. Log info	
	5. Zone Info		
GUI	Region Map	Buzzer	LED
Real time indication	1.Zone representation blink indication(Green to Red)		
	2 .Selected Voice/ sound alarm		
System requirement	Embedded computer		
	Internal RJ45/Ethernet connectivity		
	Operating system: Windows 7 and above		
	RAM: minimum 4 GB		
	System type: 64-bit operating system		



DataSheet

FIBER OPTIC PERIMETER INTRUSION DETECTION SYSTEM

- Deployment: Over ground and Underground
- Passive single mode optical fiber sensor
- Integrate with camera surveillance system
- Two hardware zones
- Over ground: Fence, wall
- Underground :under soil



ZONE SPECIFICATION

Number of zone per device	2	
Typical Zone length	~ 50 mtrs to 3000 mtrs	
Type of deployment	**Over ground**	**Underground**
Deployment scenarios	Fence, Walls	Under soil/concrete
Depth	Depends on height of fence /wall	1.5 feet below soil
Events Detected	Climbing Fence Cutting Fence Cutting Fiber Tampering fence/Wall Drilling wall	Digging Normal walking Running Drilling ground Excavations
Deployment Patterns	Parallel Lines Wave	Parallel Line Wave /Dolphin

SYSTEM COMPONENTS

Optical splitter

FOS 001

FOS 002

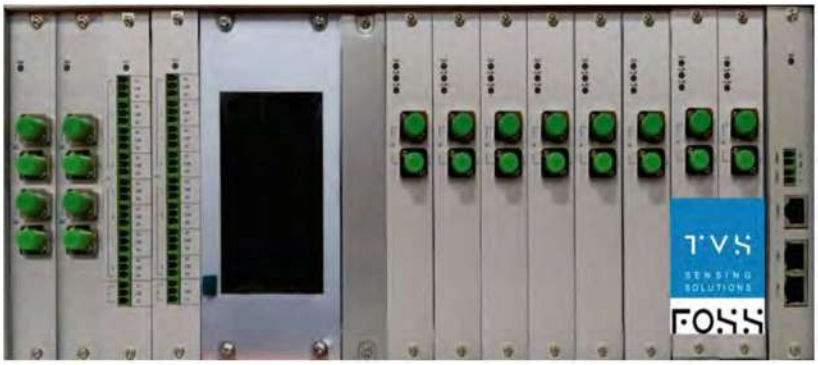
Specifications	1x2 fused splitter FOS 001	1x4 PLC splitter FOS 002
Insertion loss	<=3.7dB	<=7.40dB
Uniformity	<=0.70dB	<=0.80dB
Reflectance	<= -50 dB	
Band Pass	1310 and 1550 nm +/-40nm nm	
OperatingTemperature	-20 to +55°C	
Connector Type	None or FC/APC	
Degreeof protection	IP 65	IP 68
Dimension	240mm x 190mm x 89mm	385mm x 248mm x120mm
Material	ABS engineering Plastic	ABS engineering Plastic

DataSheet

FIBER OPTIC PERIMETER INTRUSION DETECTION SYSTEM[MULTIZONE]

Features:

- 19 inch 4U rack mountable
- Optical connectors: FC/APC
- 2,4,8 to16 zones
- Multiple Device cascading option
- Dry contact output zone wise(NO/NC)
- TCP/IP interface



safe MAX

OPTICAL INTERFACE	
Connector	FC/APC
launched power	+3 to +5.5(dBm)
Wavelength	1550 nm
Receive sensitivity	-16(dBm)

ALARM OUTPUT INTERFACE	
Output type	Contact closure output
Connector	phoenix terminal
Output number	16
Alarm responding time	<3 sec
Alarm relay time	From 1sec~10 sec, the default is 3 sec.
Relay contact rating	1 A 30 V DC 0.5 A 125 V AC

ETHERNET COMMUNICATION INTERFACE(EMU)	
Connector	RJ45
Bit rate	10 Mb/s or 100 Mb/s auto negotiation

CONSOLE INTERFACE	
Connector	RJ45
Baud rate	19200 bps
bits	8
Stop bit	1
parity check	None

POWER REQUIREMENTS	
Power supply	AC 220V/DC-48V
DC power input range	-36~72V DC
AC power input range	176~264 V
Power consumption for each card	3W±10%
Surge protection	4000 V
Mean time between failures	100000 hours

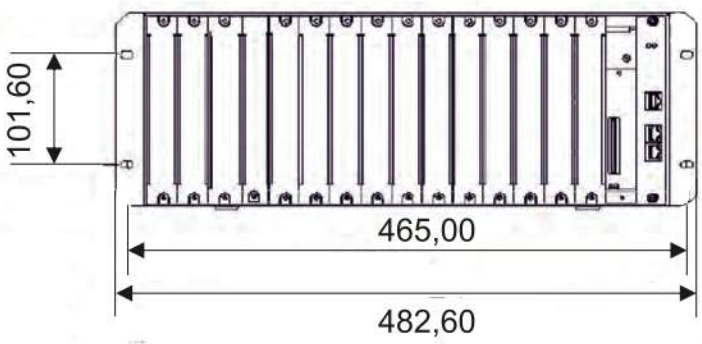
ENVIRONMENT	
Working temperature	-40~70°C
Relative Humidity	≤95%, no condensation
Storage temperature	-40~85°C
Host dimension	330mm x 178mm x 482mm

ALARM INDICATORS	DESCRIPTION		
RUN	Running indicator: green	Blink: Running normally	ON/OFF: Running abnormally
ALM1 & ALM2	Alarm indicator of zone#1&2, red. ON: The fiber is broken. ON for 3sec: intrusion or tamper alarm. OFF: No alarm. Note: the alarm relay time can be configured from 1sec~10sec, the default is 3sec.		
Voice Alarm	Siren sound using buzzer/voice descriptions for each type of alarm in software		

Alarm terminal for zone#1 & zone #16	CONTACT CLOSURE OUTPUT INTERFACE FOR ZONE#1 TO #16, ADOPTS PHOENIX TERMINAL		
	NC	Normally closed, it will be open when alarm triggers.	Note: No alarm: NC is closed, NO is open. Power down or fiber broken alarm: NC is open for long time, NO is closed for long time.
	COM	Common terminal	
	NO	Normally open, it will be closed when alarm triggers.	

SOFTWARE SPECIFICATIONS: Centralised Alarm Managament Software

It can be interfaced with Third Party Command Control Systems			
Device Interface	TCP/IP- http web interface		
Device Interface port	Ethernet port-RJ45 connector		
Alert information updates	1. Date of alarm	2. Time of Alarm	
	3. Zone of Alarm	4. Log info	
	5. Zone Info		
GUI	Region Map	Buzzer	LED
Real time indication	1. Zone representation blink indication(Green to Red)		
	2. Selected Voice/ sound alarm		
System requirement	External PC/laptop		
	RJ45/Ethernet connectivity		
	Operating system: Windows 7 and above		
	RAM :minimum 4 GB		
	System type:64- bit operating system		



DataSheet

FIBER OPTIC PERIMETER INTRUSION DETECTION SYSTEM

- Deployment: Over ground and Underground
- Passive single mode optical fiber sensor
- Over ground: Fence, wall
- Integrate with camera surveillance system
- Multiple hardware zones
- Underground: under soil

ZONE SPECIFICATION

Number of zone per device	2 or 4 or 8 or 16	
Typical Zone length	~ 50 mtrs to 3000 mtrs	
Typeof deployment	**Over ground**	**Underground**
Deployment scenarios	Fence, Walls	Under soil/concrete
Depth	Depends on height of fence /wall	1.5 feet below soil
Events Detected	Climbing Fence Cutting Fence Cutting Fiber Tampering fence/Wall Drilling wall	Digging Normal walking Running Drilling ground Excavations
Deployment Patterns	Parallel Lines Wave	Parallel Line Wave /Dolphin

SYSTEM COMPONENTS

Optical splitter

FOS 001

FOS 002

Specifications	1x2 fused splitter FOS 001	1x4 PLC splitter FOS 002
Insertion loss	<=3.7dB	<=7.40 dB
Uniformity	<=0.70 dB	<=0.80 dB
Reflectance	<= - 50 dB	
Band Pass	1310 and 1550 nm +/ - 40 nm	
Operating Temperature	-20 to +55°C	
Connector Type	None or FC/APC	
Degree of protection	IP 65	IP 68
Dimension	240mm x 190mm x 89mm	385mm x 248mm x120mm
Material	ABS engineering Plastic	ABS engineering Plastic

DataSheet

Description	Specification	
FiberType	G.652D (OS2):Single Mode	
Attenuation	at 1310 nm	= 0.38 dB/km
	at 1550 nm	= 0.25 dB/km
	at 1625 nm	= 0.26 dB/km
Chromatic Dispersion	1285 - 1330 nm	= 3.5 ps/nm.km (min)
	1550 nm	= 18 ps/nm.km
	1625 nm	= 23 ps/nm.km
Zero Dispersion Wavelength	1300 - 1324 nm	
Zero Dispersion Slope	= 0.092 ps/nm².km	
Polarisation Mode Dispersion	= 0.20 psps/vkm	
Mode field Diameter	at 1310 nm 9.2 ± 0.4 µm at 1550 nm 10.4 ± 0.5 µm	
Cladding Diameter	125 ± 0.7 µm	
Coating Diameter (Uncolored)	245 ± 10 µm	
Operation/installation/storage temperature	-30 °C to + 70 °C	

ORDERING INFORMATION

safeFENCE™

Part Number	Description	Unit Of Measurement (UOM)
FO-CPTV-2Z	2 Zone Device	Each
FO-RFM001-JC-IP65	1x2 Optical Splitter FOS001	Each
FO-RFM003-JC-IP65	1x4 Optical Splitter FOS002	Each

safeMAX™

Part Number	Description	Unit Of Measurement (UOM)
FO-IDS-ZONE2	2 Zone	Each
FO-IDS-ZONE4	4 Zone	Each
FO-IDS-ZONE8	8 Zone	Each
FO-IDS-ZONE16	16 Zone	Each
FO-RFM001-JC-IP65	FOS001: Optical Splitter	Each
FO-RFM003-JC-IP65	FOS002:Optical Splitter	Each

APPLICATIONS

- FO-PIDS can be used in areas where Perimeter protection is important. Major ones include: Protection of restricted areas such as country borders, protection force areas.


- Environmentally vulnerable areas such as forest, agriculture land, wild life sanctuaries etc.



- Buildings and areas like office spaces, schools, banks, airports, transport stations etc.





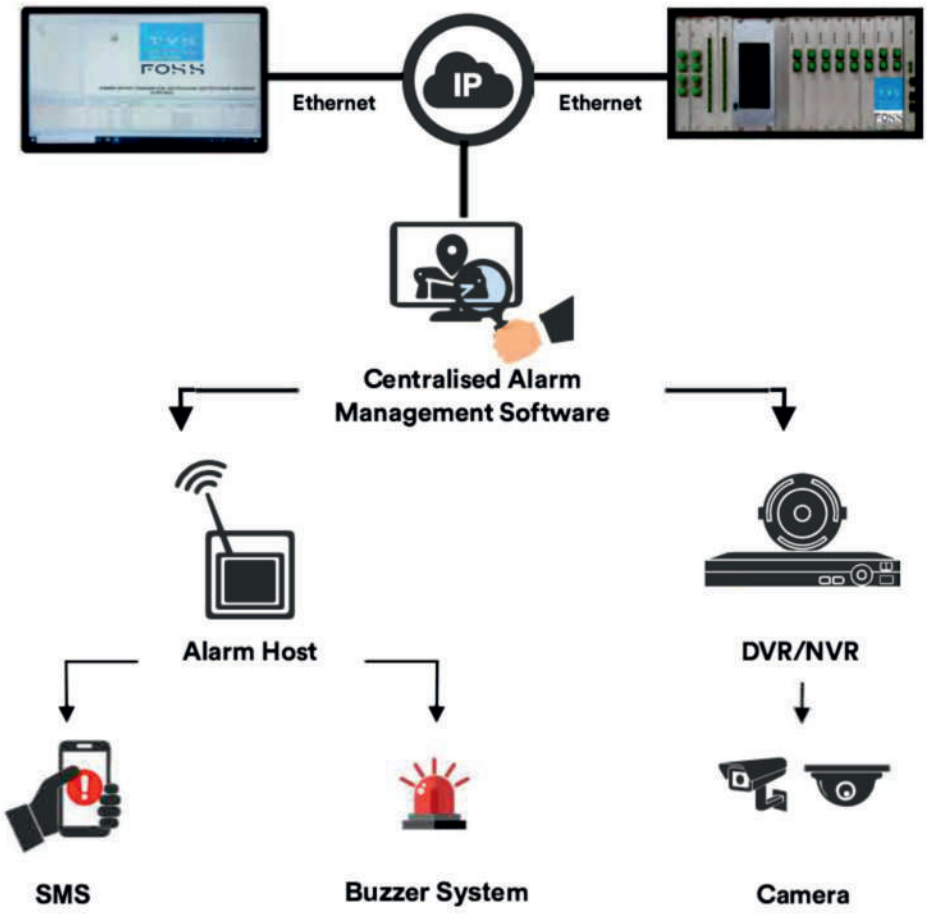
- Security breach vulnerable warning areas like prisons, nuclear power plants, research facilities, electric power stations etc.



REAL TIME MONITORING

Calibration and monitoring the zones simultaneously and individually using high performance software Equipped with Intelligent facility to help eradicate Nuisance Alarm and False Alarm to the lowest possible standard. The FO-PIDS system is also able to identify the presence of Noises (Rain, Wind, Snow, Hailstorm) and eradicate them using software reducing false alarms.

Integrated alarm joint action



Fiber Optic Sensing Solutions Pvt. Ltd.
1104, Bhumiraj Costarica,
Sector – 18, Sanpada, Navi Mumbai – 400705

www.tvsss-foss.com

info@tvsss-foss.com

022 49793916,