



Fibre Perimeter Monitoring System



Yangtze Optical Fibre and Cable Joint Stock Limited Company

Stock Code: 601869.SH 06869.HK
ADD: No.9 Optics Valley Avenue, Wuhan, Hubei, China(P.C.: 430073)
Tel: 400-006-6869 Email: 400@yofc.com
en.yofc.com

Facebook: Yangtze Optical Fibre and Cable Joint Stock Limited Company
LinkedIn: Yangtze Optical Fibre and Cable Joint Stock Limited Company
© 201909 YOFC All Rights Reserved



WeChat



Contents

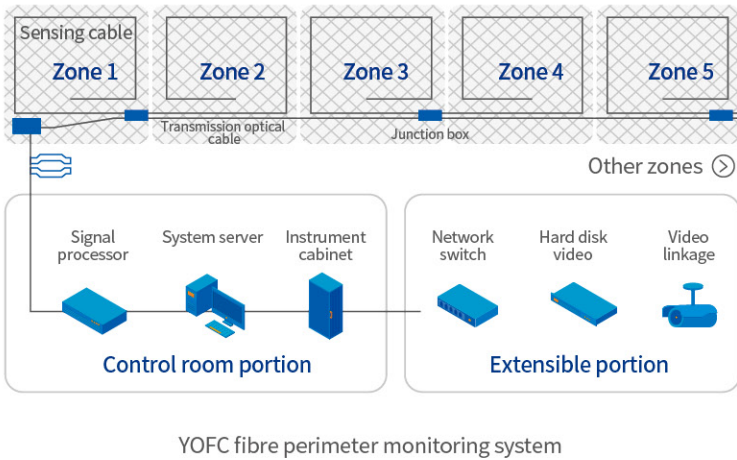


System Introduction	01
Applications	01
System Comparison	02
System Composition	03
System Characteristics	05
System Functions	06
Product Series	07
System Certificate	09
Application Cases	09
Warranty and Maintenance	12

System Introduction

Perimeter intrusion prevention is an important part of IoT applications. YOFC Fibre Perimeter Monitoring System is an alarm system which is applied with optical fibre as the sensor to realize distributed perimeter security monitoring. The main sensing component of the system is the sensing cable unit, and the specially designed cable is very sensitive to motion, pressure, and vibration. It can be used to detect climbing and shearing along fences and closures, and can also be laid under the soil, gravel or turf to detect intrusions such as pedaling and digging. When a move occurs, such as crossing, passing, climbing and violent invasion, the system will alarm.

The system can divide multiple zones as required, and each zone operates independently. The system continuously monitors multiple zones by Time Division Multiplexing technology. When an intrusion occurs, the system can detect the vibration generated by the intruder in real time,



give an alarm and find the area where the invasion is located. The signal processing unit can be installed in a monitoring room at a certain distance from the zone, and switches and video systems can be configured according to customer demand.

Applications

Compared with traditional electronic perimeter security equipment, the fibre perimeter monitoring system has inherent advantages. It has outstanding advantages such as covert detection, strong environmental adaptability, all-weather lightning protection and maintenance-free. This technology has been widely applied in the following fields:

- Flammable and combustible places - petroleum and petrification facilities (oil pipeline and oil depot)
 - High-security level places - prison, bank, consulate, museum, etc
 - Anti-electromagnetic interference places - airport and radar station
- Ultra-long-distance application places - along borders and railways
 - Water application sites - port terminals, scenic spots, and water facilities
 - Private detection site - large villa area
 - National defense security application places - defense border, military camp, armory, etc



System Comparison

Technical comparison of common perimeter security alarm systems

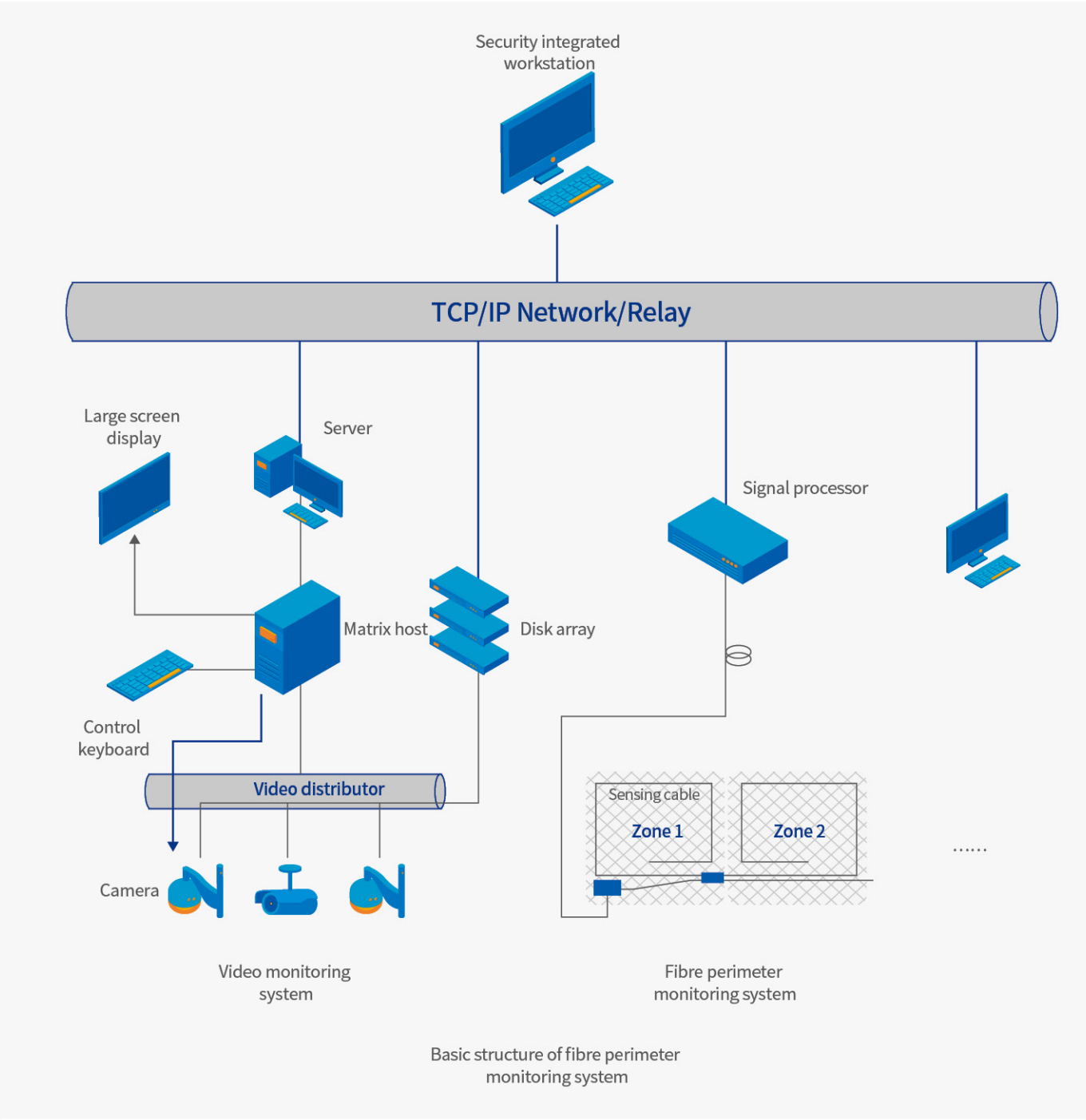
	Infrared	Video camera	Fibre perimeter monitoring system
Breakthrough probability	Easy	Difficult	Extremely difficult
Loss of energy	High, the power supply is required for each probe	High, the power supply is required for each camera	Low, passive devices for fibers
Environmental corrosion resistance	Poor, easy corrosion	Poor, easy corrosion	Anti-corrosion
Intellectualization	Low	Low, dependent on personnel monitoring	High, automatic monitoring and judgment
Reliability	Low	Low	High
Alarm function	Low	Low	High
False alarm rate	High	Low	Ultra low
Climate impact	High, cause false positives of systems	High, affect system effects	Low, unaffected by the weather
Influence of temperature	High, unstable operation above 50°C	High, unstable operation in high and low temperature	Low, strong tolerance in high and low temperature
Electromagnetic compatibility	Low	Relatively low	High, resistance to various electromagnetic interferences

It can be seen that the fibre perimeter monitoring system has the following advantages when compared with other perimeter security alarm systems:

- Intrinsic safety: The system is adopted with the passive operation mode of the zone. It does not have any electromagnetic interference or electromagnetic radiation itself. Except for the indoor monitoring terminal, non-metallic devices are used for all the system. Since the fibre itself is not electrically conductive, it is not damaged by lightning, static electricity and so on. The sensing fibre does not transmit or receive the following signals: electromagnetic signals, radar signals, and high voltage electrostatic signals
- Diversified functions: According to the characteristics of the existing perimeter facilities, they can be erected on the enclosure to build a fibre support fence, buried under the lawn, or laid on the fence. Meanwhile, the invasion direction can be determined for different areas combined with user opinions according to the site security requirements
- Corrosion resistance and long service life: It can be used in various environments such as moisture, corrosive and underwater for a long time and has a long service life
- Low power consumption: In addition to the monitoring terminal, the front end of the whole system is a passive all-fibre device, and no power supply is required
- High concealment: Unlike the conventional security settings, the system’ s geographical approach is extremely insidious and is not easily found by intruders, avoiding being damaged and crossing failure
- Adjustable sensitivity: Set the system sensitivity according to the site environment and installation method
- Unaffected by temperature: Fibre monitoring is used to protect the system from seasonal and diurnal environmental changes

System Composition

Fibre perimeter monitoring system mainly consists of a signal processor, sensing optical cable, transmission optical cable, sensing continuous unit and video system as shown in the figure below:



Signal processor

The alarm processing system is applied with the most advanced fibre sensing detection and signal processing technology. The system is suitable for standard 19-inch cabinets. When the optical cable is connected to the device, the signal processor can monitor in real time the event attempting to invade from the perimeter. A single signal processor can set up and manage multiple zones. Each independent zone can effectively monitor the intrusion vibration, continuously monitor each zone and feedback signals to the equipment terminal for processing and analysis, so as to determine whether an intrusion event occurs; meanwhile, each system of the separate zones can be individually modulated to guarantee the system in the optimum operating state.



Sensing cable

Sensor cables are divided into single-mode and multi-mode sensor cables. Multimode sensing cables can be divided into two types according to the places laid: buried sensing cables and overhead sensing cables (including fences and closures). The single-mode sensing cable is armored.



Transmission optical cable

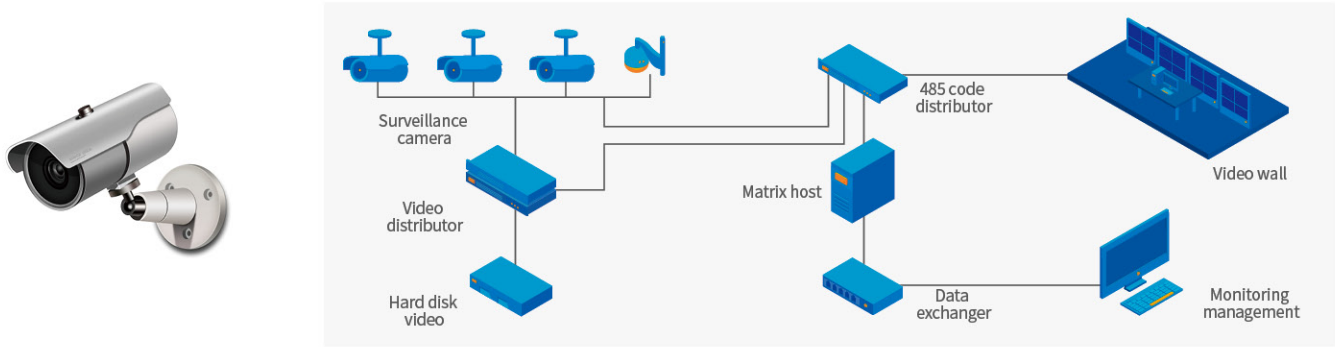
Transmission optical cable is of ordinary communication optical cable with 2-48 core optical cables mostly, mainly playing the role of signal transmission, and the specific core number is customized as specified by the system. The type of transmission cable can be selected according to customer needs.

Sensing continuous unit

The sensing continuous unit, used for protection of the continuous point of each zone, is adopted with the standard interface of international specifications.

Video system

In the design of the scheme, an HD zoom infrared laser dome network camera or gunlock is installed at the corresponding position to realize the intelligent monitoring and improve the efficiency of the system. When an intrusion alarm occurs in a certain zone, the dome automatically switches to the corresponding zone and automatically executes the preset position or cruise; the gunlock directly plots the picture and record video to facilitate the on-duty personnel to track the tour, thus achieving the combination of the alarm video review.



System Characteristics

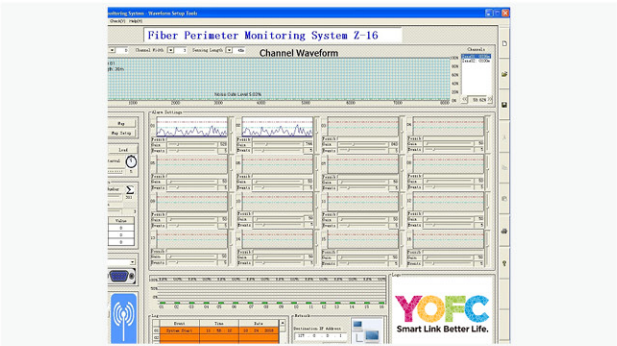
Brand quality	The components in the system are all superior products in quality and performance, which apply industrial design and adapt to various harsh environment applications, with long service life, stable operation, fast service, and strong guarantee.
Passive and no power supply, safe and convenient	In addition to the power supply required by the host in the monitoring room, the detection and transmission parts are of all-optical structures, thus no power supply is required. Without a secondary safety hazard, the two parts are green and environmentally friendly.
Lightning-prevention, exploding-prevention and resistance to electromagnetic interferences	The system inherits the excellent characteristics of optical Fibre, featuring by lightning-prevention, exploding-prevention, and resistance to electromagnetic interferences, especially suitable for application in harsh environments.
Convenient for construction maintenance, with high-cost performance	After the optical cable is laid in the system, the system can operate, featuring by a long service life and simple maintenance. In the long run, the system cost is greatly reduced.
Beautiful and concealed, diversified in laying form	The sensing cable can be divided into a fence type cable and a buried type cable. Fibre optic cables can be designed and laid in various environments such as a fence, enclosure, barbed wire, floor, indoor and outdoor sites with beautiful and concealed effects. Fence zones and buried zones can be set up in one system for diversified monitoring.
Combined with sensing and transmission, with good reliability	Both sensing and transmission are optical Fibres, which increase the detection range without relaying, and the optical Fibre has good confidentiality, with safe and durable characteristics.
Good compatibility, convenient for expanding	The alarm in the zone can send alarm protocol data to other devices and software systems via network or switch, and can freely configure the video monitoring linkage, control GSM, live recording, lighting broadcast and other alarm linkage systems. When the Fibre vibration zone generates an alarm, the system can perform linkage video monitoring, sound/light alarm and related central monitoring platform by modes of one-to-one, one-to-many or many-to-one.
Highly adaptability for the environment	The system, after algorithm and design processing, can effectively eliminate the interference of the environment such as wind, rain, thunder, and lightning, greatly reducing the false alarm rate of the system.
Complete functions and convenient operation	C/S architecture is applied to support remote web access for remote monitoring. The system is simple and quick for operation, with complete management functions and high automation.
Complete in series	The system host is equipped with a large defensive zone and a small zone, which can meet various demands and functions achievement. Special Fibre optic cables are designed as required.

System Functions

Alarm processing

In the security zone, when an intrusion such as climbing occurs, the sensing unit can accurately detect the signal and transmit the signal to the processor, and send an alarm signal after processing and analysis by the processor.

a .When the alarm is triggered, the alarm record is displayed in real time, including the alarm sequence number, alarm zone, alarm point, alarm start time, number of alarm events and remark information.



• Alarm processing

Global electronic graph

Display the distribution situation of zones and alarm sites distribution in the electronic graph, and expand voice and video auxiliary monitoring.

Alarm linkage

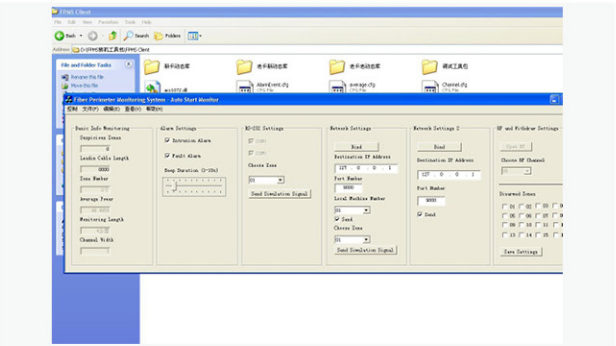
The alarm in the zone can send alarm protocol data to other devices and software systems via network or interface, and can freely configure the video monitoring linkage, control GSM, live recording, lighting broadcast, and other alarm linkage systems. When the fibre vibration zone generates an alarm, the system can perform linkage video monitoring, sound/light alarm and related central monitoring platform by modes of one-to-one, one-to-many or many-to-one.

Performance of protection against damage

In the case that the distributed fibre perimeter warning system is working properly, the system will alarm when someone destroys the optical cable.

Each zone is complete and independently adjustable and does not affect the monitoring of other zones due to disturbances or breaks in one zone.

b .The system can adjust multiple sensitivity parameters such as amplitude, frequency, and phase of the detection system, filter out some disturbance signals to eliminate false alarms caused by environmental factors such as pedestrians, vehicles, tree branches, and weather changes. This guarantees an ultra false positive rate while ensuring no false negatives for the entire system.



• Background control

System monitoring

Waveform monitoring in the monitoring point of zones: waveform curves in the monitoring points are released graphically to display the real-time waveform signal pattern of the specified sensing unit of the designated zone so that the staff can grasp the real-time operation status and related historical data of each zone in time.

System management

- a. Initial setting: After the initial parameter setting of the system is finished, the system can automatically detect the parameter information saved in the previous setting during the use of the system in the future, without setting again.
- b. Multilevel permission user management: It is convenient to add, delete, modify, and browse the basic information of users, including account numbers, passwords, and authority.etc.
- c. User login log: When the user logs in to the system, the login user information is automatically recorded.
- d. The database can be automatically backed up periodically.

Product Series



Signal processor in zone 16

Signal processor series

YOFC-FPMS-Z25	Max. length of the single zone: 800m	Select the model of the host according to practical situations such as the size of the perimeter, the number of zones and interaction with other systems.
YOFC-FPMS-Z16	Max. length of the single zone: 1000m	
YOFC-FPMS-Z8	Max. length of the single zone: 1000m	
YOFC-FPMS-Z4	Max. length of the single zone: 1000m	
YOFC-FPMS-Z1	Max. length of the single zone: 1000m	

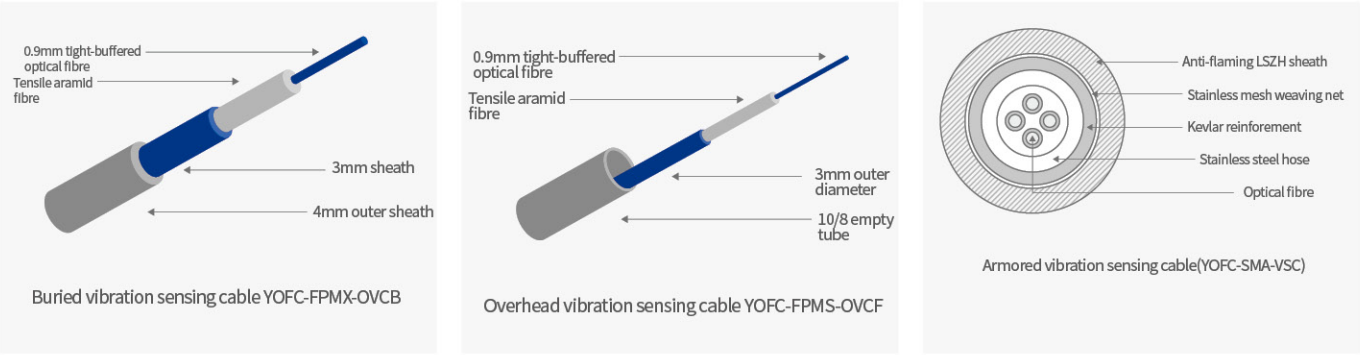
Performance parameters of signal processor in zone 16

	Item	Unit	Indicator
Host performance	Purpose	-	Anti-climbing, crossing and destroy in perimeter areas
	Max. perimeter length	Km	10
	Max. zone number	Nr.	16
	False alarm rate	-	5 Nr. / zone / month*
	The rate of missing reporting	-	0 Nr. / zone / month*
Sensor type	Sensing equipment	-	Sensitive sensing cable with single core vibration
Operating environment	Power supply	-	220v 50Hz 300W
	Host operating temperature	°C	-10 - 50
	Operating temperature for the outdoor sensor	°C	-20 - 85
	Host operating humidity	RH	20% - 65%
Interface	Extended interface	-	USB port, serial port, and network port
	Optical fiber access port	-	FC/APC
Mechanical characteristics	Host overall dimensions	mm	490× 90 ×480 (2U)
	Host overall dimensions	Kg	<15

*The measured conditions: in high sensitivity, wind and rain test field, light rain, wind level 5-6.

Sensing cable series

Model	Model description	Type	Remarks
YOFC-FPMS-OVCF	Fence-type vibrating optical cable	Multi-mode, single core	The fibre optical cable is determined by the type of host and the environment of the perimeter.
YOFC-FPMS-OVCB	Buried vibrating optical cable	Multi-mode, single core	
YOFC-SMA-VSC	Armored vibration sensing cable	Single-mode, 4-core	



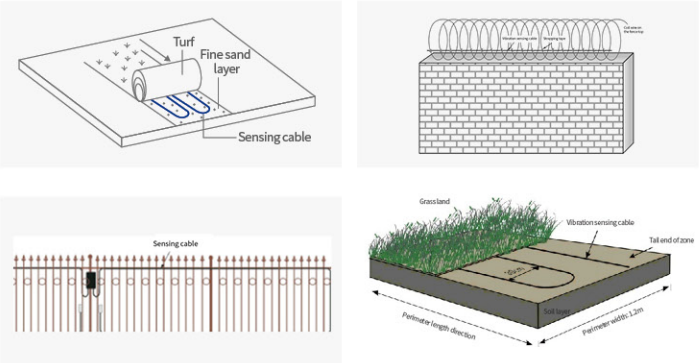
Optical performance

Model	Number of optical fiber cores	O.D.mm	Allowable stretch-ing in long/short term N	Allowable crushing force in long/short term N/100 mm	Allowable crushing force in dynamic / static conditions mm	Service tempera-ture range, °C	Net weight kg/km
YOFC-FPMS-OVCB	1	4.0	120/240	300/1000	80/40	-40 ~ +70	15.7
YOFC-FPMS-OVCF	1	3.0	120/240	300/1000	60/30	-40 ~ +70	8.4
YOFC-SMA-VSC	1~ 4	4.0	300/400	3000/4000	80/40	-40 ~ +85	26

Application environment of cables

According to the application, the sensing cable can be laid in various application environments such as land, sand, cement (ground laying), stone floors, fence, enclosure, sloping fields and so on.

Note: the information such as the picture of the host and the optical cable is subject to the actual situation of the product.



System Certificate



Application Cases

Case 1: Yunnan power grid substation perimeter monitoring system

The fibre perimeter monitoring system is installed in 110kv substation for the project, guaranteeing the safe operation of the substation under HV and electromagnetic conditions.



- * Product name: Vibration intrusion detector (Fibre Perimeter Intrusion Detector)
- * Detecting type: Type test
- * National testing center for quality of security & safety alarm system products (Beijing)

Case 2: Chongqing natural gas company perimeter monitoring system

Chongqing Natural Gas Company has installed 8 fibre perimeter systems, as the models of flammable and combustible places.



Case 3: Prison perimeter monitoring system project in harbin

The project is 1.2km in perimeter, setting up with 8 zones, 8 sentries and linkage between the camera and audible and visual alarms; in the event of an emergency, in addition to the alarm of the system, it will also be linked to the camera, audible and visual alarm to timely check the situation. In addition, the system has the unique advantage that other systems do not have in severe weather such as fog, haze and heavy snow, that is, it is not affected by the weather.



Case 4: Airport perimeter monitoring system

Intelligent monitoring is realized by the fibre perimeter monitoring system, video system, and an audible and visual alarm system.



Case 5: Military compound perimeter monitoring system project in guangzhou

The perimeter monitoring project in some military compound in Guangzhou requires safety, aesthetics and low false positive rate; the project is 400m in the perimeter and is divided into 7 zones for arming. The cable is laid on the wall of the compound and the system parameters are set for the unique climate. The system is currently operating well.



Case 6: AVIC base perimeter monitoring system

The project is about 3km in the perimeter, including 54 zones in total, with complex terrain. The fence-type and buried zones are mixed, and the project is linked with the video in effectively protecting the perimeter of the base.



Case 7: School training center indoor monitoring system in beijing

The project is set with two zones: fence-type and buried zones. The fence-type zone is set behind the cabinet, and the buried zone is set under the carpet. If someone moves the equipment in the cabinet or someone steps on the carpet, the system will immediately alarm. The system is currently operating well.



Warranty and Maintenance

YOFC has a complete after-sales service system and provides one-year free warranty and maintenance in guaranteeing long-term stable operation of the system. If the product has quality problems during the warranty period, YOFC will provide free service; YOFC can provide services for failures caused by other factors by charging maintenance fees as appropriate. Meanwhile, YOFC provides spare parts for the products for years to facilitate the maintenance of the products. YOFC aims to provide high-quality and effective information services, keep enhancing the quality of services and wholeheartedly serve customers.