The Latest in IHS3xx Technologies

Fence Mounted 'IHS3××' Perimeter intrusion detection sensor – Product Information
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1. INTRODUCTION

The Perimeter Intrusion Detection Sensor (PIDS) is broadly categorized into Fence Line and Open Area Surveillance types. Fence-type sensors are further classified based on installation methods - directly mounted on the fence or underground -, or technical characteristics. Traditional PIDS systems strengthened perimeter security by using single-technology sensors or physically adding additional technologies, but these approaches often exceeded budget constraints and faced difficulties in fully securing perimeter facilities.

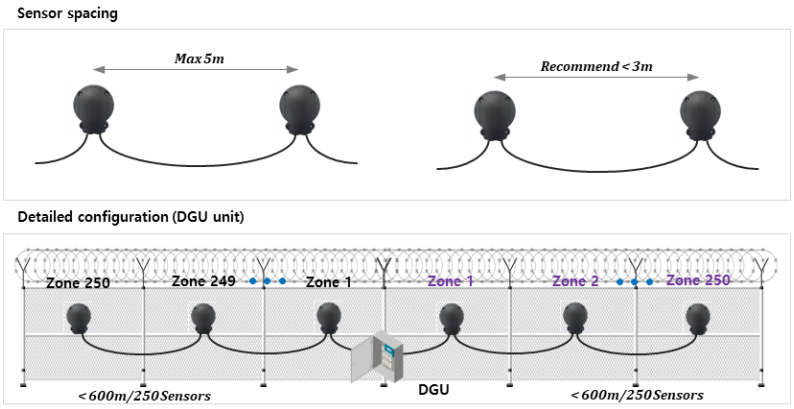
The IHS3xx Series, a direct-mount fence type, is an advanced composite sensor that integrates both Fence Line and Open Area Surveillance technologies into a single hardware unit. It employs dual-detection technology, combining passive infrared (PIR) for detecting body heat and size of approaching objects at close range, and vibration detection to identify physical activity on the fence by detecting changes in acceleration. This is an all-in-one sensor retaining the unique capabilities of both technologies while offering enhanced functionality.

The IHS enhances decision-making elements by integrating and correlating data from individual technologies. By simplifying sensor configuration, it leverages machine learning and AI to automatically analyze data obtained from the two technologies and determine alarms. Furthermore, its proprietary design and integrated circuit architecture provide improved digital signal processing (DSP) for both passive infrared and MEMS accelerometer technologies.

The IHS ultimately assures users that it is the best technology for identifying real pre-threats and detecting intrusions by reducing the False Acceptance Rate (FAR) and improving the Probability of Detection (Pod) and Confidence Level (CL)

+ IHS3xx Series

To suit various installation targets and functionalities, there are models with different capabilities: the vibration-only IHS300, the combined approach and vibration models IHS302 and IHS320, and the IHS3xxRP models, which enhance communication range. The IHS302, with a pair of infrared lenses positioned on the rear, and the IHS320, with lenses on the front, are designed for use on Y-pickets or at the top of security fences.



+ Dual-detection technology

The IHS3xx Series analyze tri-axis acceleration data within approximately Ø3m (up to Ø5m) caused by vibrations, while the IHS302 and IHS320 detect the heat of objects approaching within a horizontal range of 180° and a distance of 3m (up to 5m). The sensor and DGU are equipped with two communication buses, allowing connection of up to 500 sensors per DGU (250 per port), which enables a maximum detection range of 1,200m (for 3m panels). There is no limit on the number of DGUs that can be used within a single system.

+ Sensor Connection

The sensors are connected using a dedicated 5-wire cable, with two wires each designated for communication and power. This eliminates the need for additional cables and simplifies system installation through an interconnection method between adjacent sensors.

+ Redundancy and Line Monitoring

The IHS3xx Series system includes essential features such as cable cut monitoring and ring communication bus functionality. These features ensure that, even if the connecting cable between sensors is cut or shorted at any point, the system maintains full operational functionality. This capability is particularly crucial for high-risk sites.

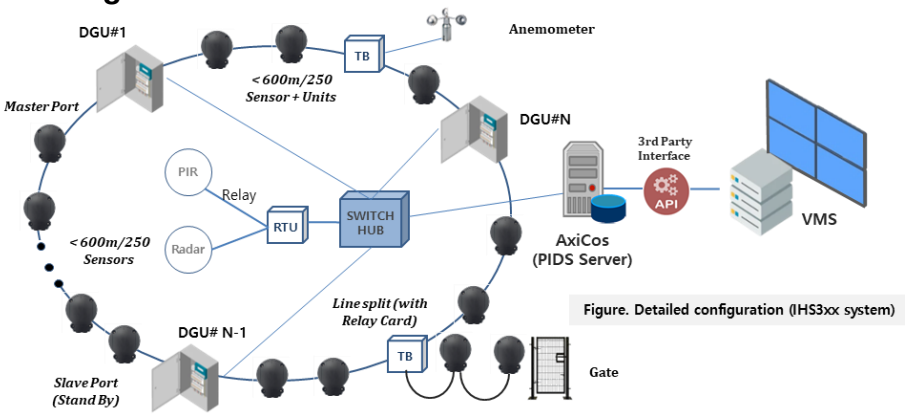


Figure. Detailed configuration (IHS3xx system)

+ Operating Environment

The IHS3xx Series can be installed on all standard fence types (e.g., traditional mesh, welded wire mesh, top fence extensions) as well as non-standard types (e.g., metal plate fences, welded decorative fences). Two types of dedicated brackets are provided for easy installation on standard fences, and additional auxiliary devices can be manufactured to suit specific customer installation types.

+ Applicable Industries

The system is used to secure perimeter zones of all sizes and types, including military facilities, ports and airports, petrochemical and industrial complexes, utility sites, and nuclear facilities. It supports interfaces with market-leading VMS and SIP manufacturers' software on an IP network basis.

+ System Components

The IHS300, IHS302, and IHS320 models, along with the IHS300RP, IHS302RP, and IHS320RP models with extended communication range, consist of sensors installed on fences, a DGU to manage the sensors, and a dedicated integrated control platform, AxiCos (IPMS). Additional optional devices include the IHSLP line surge protector, a line splitter and input/output device, the IHS300TB for collecting analog signals such as from an anemometer, and the RTU, a high-capacity input/output device.

+ DGU

As a data collection processor device, it manages up to 500 sensors over two communication buses for boundary facilities up to 1,200 meters, with a 3-meter spacing between sensors. Including the separation cable, the length of the communication bus is limited to a maximum of 600 meters. In addition to enabling sensor configuration through Web software, it automatically recognizes, classifies, and triggers alerts from sensors.

+ IHSLP

It protects sensors from overvoltage surges entering through the line. For instance, it is installed on a 5-wire cable to enhance system resistance against electromagnetic fields and overvoltage peaks caused by nearby lightning strikes. It uses the same housing as the IHS3xx sensors.

+ IHS300TB

It features a splitter function that allows separation of sensor cables and connects two security sensors (e.g., magnetic sensors, motion sensors, infrared sensors, lamps). It is very easy to install and integrates seamlessly with the IHS communication bus, making it an ideal auxiliary device for gate security.

The IHS300TB, in particular, can be placed anywhere along the line, and it is recommended to install the IHS300TB on-site when the line is connected in a ring or when a protected detection line is in place. The number of sensors on the DGU communication bus is limited to 500, including this device.

+ RTU
The multi I/O LAN Module, RTU, includes four relay outputs and 16 dry contact inputs. It can operate in standalone mode or network mode, and the relays can be controlled by AxiCos (Software).

+ AxiCos
AxiCos is a powerful intrusion detection system management tool and a user-friendly, Windows®-based security monitoring and control application, designed as enhanced security management software for integrated alarm monitoring and control of boundary facilities. It manages associated devices and facilitates interfaces such as VMS and AUDIO.

+ Sensor Cable
The IHS Series cable string is pre-wired, sealed, and tested at the factory to ensure potential IP66 rating in the field and to minimize wiring errors. The pre-wired sensor string features convenient dedicated plug connectors on both ends, enabling fast and error-free communication and electrical connections.

2. Benefits

2.1. Pinpoint Location
Each sensor is assigned a unique ID. Additionally, with special signal processing technology and analytical algorithms, it can quickly and accurately identify the location within 3 meters of precision during an intrusion attempt.

2.2. Automatic Threshold Adjustment
The sensor automatically adjusts its threshold based on changing conditions or environmental factors. For example, during "conditional operation," the threshold for secondary vibration is sensitively lowered after detecting initial approach, while in severe weather, wind speed data is analyzed to raise the threshold, reducing false alarms.

2.3. Minimizing Nuisance Alarms
Algorithms like "automatic adjustment via anemometer" and "adjacent sensor data comparison" significantly reduce false alarms triggered by weather conditions such as rain, wind, hail, and lightning.

2.4. Ring and Star topology
The sensor line can be freely branched, reducing installation costs and making it easy to build systems for irregularly shaped or large boundary facilities.

2.5. Redundancy support
The DGU includes two sensor connection communication ports with Sensor Alive monitoring and automatic port switching. When configured in a ring, if a cable break occurs, automatic port switching keeps the system running without interruption.

2.6. Anti-Removal
MEMS sensors collect gravitational acceleration in free space to confirm positional (axis) information. They memorize their installation position, and if moved beyond a set angle (e.g., 5°) from this remembered position, an alarm is triggered. This function detects sensor removal from fences or intrusion attempts.

2.7. Lower Cost of Ownership
Compared to traditional sensor methods, overall installation and maintenance costs are reduced. The sensor cable transmits both power and data, eliminating the need for additional cables.

2.8. Integration with 3rd party systems
AxiCos provides a programmable TCP/IP-based open API and I/O device (RTU) to enable seamless system integration. This interface allows real-time information access across various devices.

3. Features

3.1. System Features

3.1.1. AxiCos (IPMS) Software

- Complete Integration with IHS3xx Seriese and Connected Devices
- Icon-Based, Intuitive Graphic User Interface
- ✓ Excellent visibility with text and map information display
- ✓ Displays alarms and cameras on the graphic map
- ✓ Integrated VMS live camera feed display
- Customizable Screen Layouts
- Web Browser-Based Platform
- ✓ Low-cost, easy multi-access, and multi-site deployment
- Comprehensive Alarm and Event Management
- ✓ Automatic logging of all user actions and alarm response times
- ✓ Alarm record verification function and information statistics display (Dashboard)
- ✓ Alarm events with notes and reporting function
- ✓ Management of multiple alarms simultaneously with visual/audible alerts
- ✓ Individual/group map operation
- Monitoring and Management of Connected Devices
- ✓ Monitoring of sensor operating status and line faults
- ✓ Status monitoring of the DGU (Data Gathering Unit)
- Data Copy (Backup) and Storage Functionality
- Communication Encryption (Server-DGU: AES algorithm / DGU-Device: Dynamic encryption algorithm)
- I/O Module Expansion - Provides sensor input and relay output
- Scalable Windows®-Based TCP/IP Architecture with MS SQL Database
- 3rd Party Interface API Support
- Recommended Hardware
- ✓ PC Processor: Intel Quad Core 3.1GHz (i7) or better
- ✓ Operating System: Windows 11 Pro or Server 2022 64 bit or better
- ✓ DB : Microsoft® SQL Server® 2022 or better
- ✓ Memory: 16GB or better
- ✓ Hard Drive: 1TB or better
- ✓ LAN: 1GB network port; optional second LAN port
- ✓ Audio Output: Sound card and speakers
- ✓ Video Output: (1) Monitor: 1GB graphics card supporting DirectX 11, 1024 x 768 display Video Output (2) Monitors: 2GB dual output graphics card supporting DirectX 11, 1024 x 768 displays
- ✓ Optical Drive: CD-RW/DVD
- ✓ Printer Port: Parallel, USB, or network
- ✓ USB ports: (for Keyboard, Mouse, Printer)

3.2. Hardware Features

3.2.1. IHS3xx

- Detection of Vibration, 3-Axis Acceleration, and Tilt Changes
- Motion Detection through Thermal Analysis Using a Pair of PIR Sensors (IHS302/320 Models)
- Dual CAN Communication Bus Configuration
- False Alarm Prevention Technologies
- ✓ Automatic Sensitivity Adjustment with Anemometer Integration (Weather Mode)
- ✓ Natural Vibration Compensation (Wave Filter Mode)
- ✓ Differential Comparison of Adjacent Sensors
- ✓ Vibration and Approach AND Operation (IHS302/320 Models)
- ✓ Sensitivity Adjustment Mode for Preliminary Motion Detection (IHS302/320 Models)
- Automatic ID Assignment (ID Setting Mode)
- Status Monitoring - Realtime Monitoring of Sensor and Cable Integrity via Alive Signal
- Tamper Monitoring Function
- Specification
- ✓ Processor : Arm® Cortex-M4 32-bit Processor
- ✓ Technology Used: 3-axis accelerometer (tilt) (±2/±4/±8/±16g full scale), Pyroelectric infrared sensor (Pyro Sensor)
- ✓ Detection Range: Vibration - fence area Ø1.5m (max 2.5m), Approach - Up to 90° vertical, 180° horizontal, within 3m (up to 5m)
- ✓ Communication : 2-wire communication (CAN)
- ✓ Status Indicator: 2-color LED (Alive, Alarm, Offline, etc.)
- ✓ Applicable: EX Metal, Welded Mesh, etc.
- ✓ Dimensions: 96(L) x 115(H) x 43(D) (mm)
- ✓ Certifications : IP66, IK09, KC

3.2.2. IHS3xxRP

- IHS3xx - Includes Sensor Functionality
- CAN bus repeater
- CAN Bus Distance and Node Expansion Capability
- Recommended for Use with a Minimum of 50 Additional Sensors

3.2.3. SC1000(Data Gathering Unit)

- IHS3xx Series Sensor Data Collection Device
- Sensor configuration management, information processing, and integration management processor
- Stores up to 100,000 offline history records
- Dual CAN buses for sensor ring configuration and active/standby operation
- Embedded Web Tool provided

✓ IHS Configuration Setup
✓ Sub-device alarm ON/OFF settings, sensitivity settings, function settings (And, Wave, Group)
✓ Sensor ID Management
✓ PIR signal schedule management
✓ Real-time alarm status monitoring

- Specifications

✓ Processor: Arm® Cortex-M4 32-bit Processor
✓ Device Communication: Ethernet(10/100MB) 1port / CAN 2ports / RS485 1port
✓ Sub-devices: Connects up to 500 devices (IHS3xx, IHS3xxRP, IHS300TB)
✓ Detection Range: Up to 600m (250 sensors) per port, up to 1200m (500 sensors) per DGU
✓ Input/Output: 2 digital inputs / 2 digital outputs
✓ Communication Security: AES-128 algorithm with higher-level devices, dynamic encryption algorithm with sub-devices
✓ Power : DC 24V@ Max 100mA
✓ Certifications : KC

3.2.4. IHSLP

- Overvoltage Electronic Protector
- 4-wire serial connection for communication and power
- Recommended for use when expanding by units of 50
- Same housing as the sensor

3.2.5. IHS300TB

- Sensor Cable Branch Device connected to the DGU via CAN communication, for branching communication buses between gates/fences
- Environmental Data Collection Function and wind speed sensor connection for collecting and transmitting wind speed data
- Digital 2-Input (2-phase to 4-phase) Signal Detection, supporting NO-NC auto-detection (compatible with infrared, radar, LiDAR, and third-party sensors)
- Digital 2-Output for integration with external devices like warning lights, lighting, and speakers
- Analog (Voltage) 1-Input for connecting environmental sensors (e.g., anemometer)
- Tamper input port
- Three CAN Communication Bus Configuration (for branching between fence gates, etc.)
- Specifications

✓ Processor : Arm® Cortex-M4 32-bit Processor
✓ Input Ports: 2 digital inputs, DC 0–5V (Line Open, Open, Close, Short); 1 analog input
✓ Output Ports: 2 digital outputs, 30VDC / 2A
✓ Tamper Port : 1 input Port

3.2.6. RTU(SD600io)

- I/O Control Device (16 Inputs, 4 Outputs)
- 16 Digital Dry Contact Inputs (2-phase to 4-phase), with NO-NC auto-detection (supports infrared, radar, LiDAR, and third-party sensors)
- 4 Digital Outputs for integration with external devices like warning lights, lighting, and speakers
- Supports remote installation via Ethernet communication
- Input/output information managed by AxiCos
- Specifications

✓ Processor : Arm® 32-bit RISC Processor
✓ Communication Ports: Ethernet(10/100MB) - 2 Ports, RS232, RS485, CAN - 1 Port
✓ Input Ports: 16 Digital inputs, DC 0~5V (Line Open, Open, Close, Line Short)
✓ Output Ports: 4 Digital outputs, 30VDC / 3A
✓ Analog Ports: 4 Analog Inputs, DC 0~5V or 4~20mA
✓ Power : DC 12V ~ 15V@Max. 200mA
✓ Size: 224(W) x 160(D) x 20(H) mm
✓ Certification: KC

4. Integrated with

NVR(With IP CAMERA) : Hanwha Vision, IDIS. Ltd
IP Speaker : Axis Communications

5. Summary

The IHS3xx Series is an integrated sensor utilizing dual technology, significantly improving upon traditional single-technology systems. Designed for fence-mounted perimeter intrusion detection, it combines dual technology within a single integrated circuit and housing, offering advanced functionality and a variety of performance features that lead the current industry standards.

The IHS3xx Series can preemptively detect approaching objects, and it senses vibrations and movements on fences caused by direct cutting, intrusion, or climbing attempts. With a manufacturer-specific analysis algorithm, it minimizes false alarms, ensuring high reliability.

When sensors are spaced 3 meters apart, the DGU can manage up to 500 sensors (including 3xxRP models) or combine with the IHS300TB on two communication buses, covering up to 1,200 meters of secure perimeter.

The IHS3xx Series is economical and versatile, suitable for installation on various fence materials and structures in diverse environments, such as urban areas, coastal regions, and mountainous locations. It not only detects intrusions and their precise locations but also minimizes installation costs.