



Since 1980, PROTECH has been designing, manufacturing, and marketing Perimeter Intrusion Detection Systems (PIDS) to protect personnel, property, and assets at sensitive sites. We manufacture systems that give early warning of potential threats at the perimeter. PROTECH offers a complete range of perimeter intrusion detection systems and technologies including – G-FENCE fence-mounted intrusion detection, infrared beam technology (invisible fences), PIRAMID dual technology motions sensors and video analytic object detection and tracking. Our technology can be integrated with monitoring applications including Protech’s MAXIBUS, Smart Bridge, or Spectra.

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## ACTIVE INFRARED BARRIER

### DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

#### MasterFormat 2020

**28 31 21 Area and Perimeter Intrusion Detection**

**28 31 21.17 Fixed Optical Beam Area and Perimeter Security Systems**

#### Notes to Specifier:

1. Where several alternative parameters or specifications exist, or where, the specifier has the option of inserting text, such choices are presented in **<bold text>**, where the parameter specified in [brackets] is the normal default.
2. Explanatory notes and comments are presented in *italic* text.

## ACTIVE INFRARED BARRIER

### PART 1 GENERAL

#### 1.01 SUMMARY

- A. Section includes an autonomous active infrared barrier system.
- B. Product - A system consisting of two sensing towers which integrate transmitter and receiver functions in a single tower and create an infrared intrusion barrier and report to a Maxibus hub via radio transmission.
- C. Related Requirements
  - 1. 28 01 30 Operation and Maintenance of Security Detection, Alarm and Monitoring
  - 2. 28 05 35 Security Data Communications Wireless Transmission Equipment
  - 3. 28 06 30 Schedules for Security Detection, Alarm and Monitoring
  - 4. 28 31 31 Intrusion Detection Interfaces

#### 1.02 REFERENCES

- A. Definitions
  - 1. Cell – A mono directional Infrared transmitter-receiver device installed in a tower. A pair of cells, installed in 2 different tower, will create an Infrared detection beam between these towers.
  - 2. Single face – Infrared beam transmission or reception from one surface (face) of a sensing tower.
  - 3. Double face – Infrared beam transmission or reception, or both, from opposing surfaces (faces) of a sensing tower.
  - 4. LoRa - a physical proprietary radio communication technique, based upon spread spectrum modulation techniques derived from chirp spread spectrum (CSS) technology.
- B. Abbreviations
  - 1. AES – Advanced Encryption Standard
  - 2. UHF – Ultra-high frequency
- C. Reference Standards
  - 1. Electromagnetic compatibility
    - a. EU EMC Directives EN 55022, EN 55024
    - a. FCC-47 CFR Part 15, Class B
  - 2. Encryption – NIST Federal Information Processing Standards (FIPS) Publication 197 – Advanced Encryption Standard (AES)
  - 3. IEEE 802.3 Ethernet
  - 4. Environmental
    - a. ANSI/ IEC60529 - Degrees of Protection Provided by Enclosures
    - b. International Electrotechnical Commission (IEC) - Ingress Protection Rating IP55

**1.03 SUBMITTALS**

- A. Product Data
  - 1. Manufacturer's printed or electronic data sheets
  - 2. Manufacturer's installation and operation manuals
- B. Shop Drawings
- C. Termination points and enclosures

**1.04 QUALIFICATIONS**

- A. Manufacturer of system shall have a minimum of five (5) years' experience in the design, manufacture, and successful implementation of perimeter sensing systems.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver the equipment system in the manufacturer's original, unopened, undamaged container with identification labels intact.
  - 1. Ship and store the system protected from mechanical and environmental conditions as designated by the Manufacturer.

**1.06 WARRANTY**

- A. The Manufacturer shall provide a limited warranty for the system to be free of defects in workmanship and material under normal operating conditions for a period of two years from the date of product shipment.

- END OF SECTION -

## PART 2 PRODUCT

### 2.01 EQUIPMENT

- A. Manufacturer: PROTECH/Protection Technologies, Inc.  
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- B. Model: SOLARIS
- C. Alternates: None

### 2.02 GENERAL DESCRIPTION

- A. The system shall detect all attempts at intrusion by using adjustable infrared barriers formed by two or more solar-powered sensing towers, each of which communicates alarm information to a head-end alarm processing hub via LoRa radio communications.
- B. Intrusion detection shall be based upon the interruption of pulsed infrared beams between sensing towers.
1. Number of beams between towers: Up to 10 beams
  2. Beams shall be multiplexed and optically synchronized.
  3. The system shall have selectable detection/triggering modes.
  4. Sensing towers shall be available for single or bi-directional infrared beam operation in double face operation.
  5. Sensing towers shall be available configured as infrared transmitters, infrared receivers, or both.
- C. Alarm Response time: 40 ms - 800 ms selectable
- D. The wireless UHF communications transmissions from each sensing tower shall form a secure mesh network, immune to electromagnetic interference.
- E. System information encryption: AES 128-bit
- F. Intrusion detection shall be based upon the interruption of pulsed infrared beams between sensing towers, spaced with a maximum range of 328 feet (100 m).
- G. Each sensing tower shall have a solar panel and back up battery.
1. The battery back-up shall provide a minimum of 4 weeks of autonomous operation time under normal operation.
- H. Each sensing tower shall have an anti-climbing cap at the top, which shall detect the action of someone pushing on the cap.
- I. Each sensing tower shall have anti-condensation caps to prevent the formation of condensation and ice on the tower.
- J. Each sensing tower shall have integrated alignment tools.
- K. The sensing tower shall be capable of in-line, corner, or wall mounting.

## 2.03 SYSTEM COMPONENTS

### A. Sensing Tower

1. Number of beam directions (faces): 1 or 2
2. Number of beams per direction: 3 – 10
3. Number of selectable pulse frequencies: 4
4. Wireless Communications:
  - a. Modulation: LoRa
  - b. Frequencies | Channels:
    - 1) 906 MHz – 924 MHz | 19 channels
5. Power
  - a. Solar: 6 V, 250 mA
  - b. Battery pack: 4 V, 5 Amp-hour
6. Physical
  - a. Tower height: <3 ft (1 m)>< 5 ft (1.5 m)> <6 ft (2m)> <8 ft (2.5 m)>  
<10 ft (3 m)>

a. *Protech Part numbers for sensing towers are as follows:*

<i>Part no.</i>	<i>Height</i>	<i>Faces</i>	<i># Beams per Face</i>
<i>Tower 1MSF</i>	<i>3 ft. (1 m)</i>	<i>1</i>	<i>3-4</i>
<i>Tower 1MDF</i>	<i>3 ft. (1 m)</i>	<i>2</i>	<i>3-4</i>
<i>Tower 1M50SF</i>	<i>5 ft. (1.5 m)</i>	<i>1</i>	<i>3-5</i>
<i>Tower 1M50DF</i>	<i>5 ft. (1.5 m)</i>	<i>2</i>	<i>3-5</i>
<i>Tower 2MSF</i>	<i>6 ft. (2 m)</i>	<i>1</i>	<i>5-8</i>
<i>Tower 2MDF</i>	<i>6 ft. (2 m)</i>	<i>2</i>	<i>5-8</i>
<i>Tower 2M50SF</i>	<i>8 ft. (2.5 m)</i>	<i>1</i>	<i>6-8</i>
<i>Tower 2M50DF</i>	<i>8 ft. (2.5 m)</i>	<i>2</i>	<i>6-8</i>
<i>Tower 3MSF</i>	<i>10 ft. (3 m)</i>	<i>1</i>	<i>6-10</i>
<i>Tower 3MDF</i>	<i>10 ft. (3 m)</i>	<i>2</i>	<i>6-10</i>

- b. Environmental
  - 1.) Each tower shall be provided with anti-ice and anti-condensation caps which, when mounted, can be removed or reinstalled as one single piece.
  - 2.) Towers shall be IP55 rated.
7. Alarms
  - a. Intrusion alarms
    - 1) Detection shall normally require the interruption of 2 adjacent cells.

- 2) Detection shall be configurable to also permit detection based on the interruption of only the bottom beam.
- b. The following types of local alarms shall be capable of being generated by the sensing tower:
  - 1) Intrusion
  - 2) Disqualification
  - 3) Radio loss
  - 4) Tamper
  - 5) Anti-climbing cap
  - 6) Battery low voltage

*Note: Intrusion alarms are only available on the receiver tower.*

8. Integrated alignment tools shall indicate the quality of the incoming signal and include all of the following:
  - a. optical sight
  - b. LED's
  - c. audible buzzer
9. Settings
  - a. Response time - Intrusion alarm response time settings shall be selectable via potentiometer between 40 and 800 milliseconds.
10. Detection
  - a. Channel
    - 1) A common channel setting between two adjacent towers shall create an association which defines a barrier.
    - 2) Number of independent channel settings: 4
11. Identification - Available identification settings:
  - 1) network address
  - 2) fixed radio ID

#### B. Radio Coordinator

1. A radio coordinator shall provide the interface between the sensing towers in the field and a head-end alarm processor hub (Maxibus hub).
  - a. The radio coordinator shall receive information via wireless radio over the broadcast frequencies assigned to the sensing towers.
  - b. Hub Communications: RS-485 with Modbus TCP protocol
2. Electrical
  - a. Voltage range: 10.5 – 14 VDC
  - b. Power consumption: 40 mA
3. Operating temperature: -40°F to +158°F (-40° C to +70° C)

#### C. Alarm Information Hub (Maxibus hub)

1. The hub shall centralize all system alarm information from the radio coordinators and from other sensing systems provided by the Manufacturer.
  - a. Communications: RS-485 with Modbus protocol

2. The head-end hub shall provide its information to the Manufacturer's or third-party management systems.
3. The head-end hub shall provide for automatic configuration of the sensing network, including detection of the sensors connected to the network and number of available contacts.
4. The head-end hub shall provide diagnostic information for each tower.

*MAXIBUS is PROTECH's alarm information hub. See separate specification document.*

*Smart Bridge is a software that connects PROTECH's MAXIBUS various VMS software platforms.*

**D. Configuration and Maintenance Software**

1. Configuration and Maintenance software ("software") shall be available as a PC-based graphical tool intended for configuration and basic monitoring of the system
2. Functions
  - a. Viewing sensing node (tower) status
  - b. Import a site layout in image file format
  - c. Display all system components on a map
  - d. Display the location of an intrusion alarm on a map
  - e. Display a current event log
  - f. Train discrimination feature setting

- END OF SECTION -

**PART 3 EXECUTION**

**3.01 INSTALLERS**

- A. The Contractor's installers and technicians shall be factory trained and certified to install, service, and maintain the system.
- B. Contractor personnel shall comply with all applicable state and local licensing requirements.

**3.02 INSTALLATION**

- A. The Contractor shall adhere to all Manufacturer's published installation procedures, diagrams, and guidance.
- B. Sensing Towers
  1. Sensing tower solar panels shall not be installed in front of a hedge, in a shaded area, or in any other location that would impede sunlight from reaching the solar panel.
  2. All vegetation shall be cleared from the sight path between adjacent sensing towers.

- END OF SECTION -