

# **Impact Monitoring System (IMS™)**

## **GENERAL SPECIFICATIONS**

### **I. GENERAL**

All Impact Monitoring Systems (IMS) shall be designed and manufactured by NuMetrics, Inc. and distributed by Energy Absorption Systems, Inc.

### **II. DESCRIPTION OF SYSTEM**

#### **A. General**

The IMS uses Remote Alarm Monitoring System (RAMS™) technology that provides indication of a shock or vibratory event to a crash cushion. Assigned individual(s) receive an Impact Alert email message. This is a notice of an event and the location at which the event has been recorded. This allows assignee to respond as needed to each event.

When an event occurs, an IMS sensor activates the RAMS Module, which records the time of the event. It then sends an Impact Data Report through the Cellular Carrier System (CCS) to the Central Monitoring Center (CMC). The CMC sends an Impact Alert email message to the assigned individual(s) describing the type and time of the alert and the pre-programmed location of the IMS that recorded the alert. After an event, the RAMS Module automatically checks for proper operation and resets itself. A Status Alert email message will be sent to the assigned individual(s) if the RAMS Module cannot reset itself.

#### **B. Component Description**

##### **Sensors and Cable**

The sensors that activate the IMS are vibration switches that respond to low levels of vibration or shock load. The switches are normally open and are wired in parallel. The sensor boxes have either 2 or 4 wire connections. The sensor electrical system is low voltage and low current. The cable shall be UL listed NEC type FPL or PLTC, 105°C sunlight resistant, water tight, direct burial rated. It shall be made up of one twisted pair of 18 AWG wires with 0.015" PVC insulation.

##### **RAMS Module**

The RAMS Module includes a 5-year lithium battery pack, controller, and cell phone circuitry. This is enclosed in a vandal resistant NEMA 4X weather-tight enclosure. The RAMS Module monitors all of the sensors and cabling every hour and battery strength and Radio Signal Strength five times per month to ensure integrity.

##### **System Operation**

After any single sensor is triggered by an event, the RAMS Module sends an Impact Data Report to the CMC. The RAMS Module then checks the sensors multiple times during the next 4 hours to ensure proper operation. If operation is normal, no Status Data Reports will be sent to the CMC. If the RAMS Module cannot transmit an Impact or Status Data Report, then it will wait 10 minutes before attempting to send that Data Report again. It will attempt to re-send each Data Report a total of six times or until it is received by the CMC.

Every hour, the RAMS Module checks the status of the sensors. If the RAMS Module detects a sensor error, it will send a Status Data Report to the CMC. The CMC will then send a Status Alert to the assigned individual(s).

### **Cellular Carrier System**

The Cellular Carrier System is Cellemetry Data Service, which works with local cellular companies around the U.S. for cellular coverage. The RAMS Module sends Impact Data Reports and Status Data Reports to the CMC through Cellemetry Data Service. Thus, Cellemetry Data Service coverage must be available at the site for the RAMS Module to function properly. A two-year minimum service contract with Cellemetry Data Service is included with every new RAMS Module. This service contract can be renewed for additional two-year periods.

### **Central Monitoring Center (CMC)**

The CMC receives Impact Data Reports and Status Data Reports from RAMS Modules through the CCS. The CMC is a computer that determines which RAMS Module sent a message and relays an Impact Alert or Status Alert email message to the assigned individual(s) for further evaluation. Each Alert email message sent by the CMC includes the RAMS Module unit number, installation date, name, and location including state, county, city, street, lane and location. Status Data Reports from the RAMS Module provide battery strength and sensor status.

## **IV. REQUIREMENTS**

### **A. Telephone Service Requirements**

Cellemetry Data Service phone service shall be available at the installation location of the IMS. Energy Absorption Systems can be contacted to help determine whether coverage is available at a given site.

### **B. Email for receiving messages**

The timeliness of responding to IMS messages is tied to the ability of the customer to monitor email messages in a timely manner. The responsible authority for maintenance of the crash cushion should have one or more email addresses that can receive messages 24 hours per day, 7 days a week. At least one of the email addresses must be monitored regularly at all times.