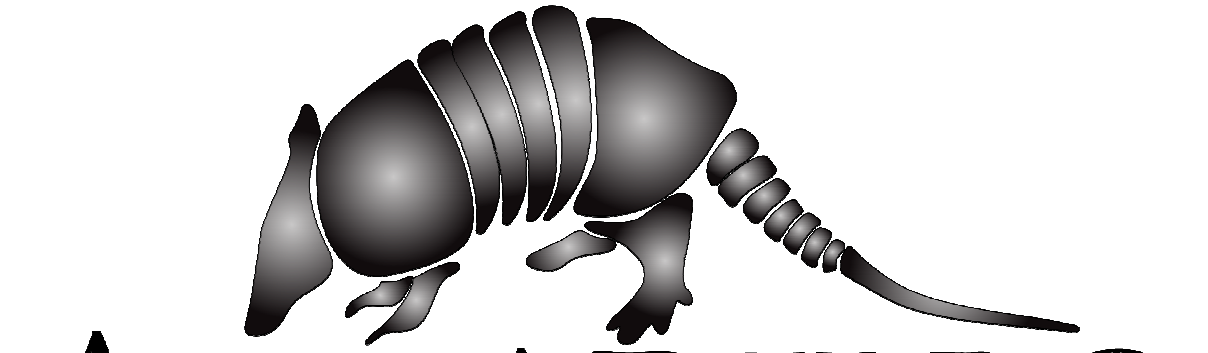
pureHM®
THE PIPELINE PROFESSIONALS

Armadillo
Above-Ground-Marker HC-1
USER'S GUIDE



ARMADILLO
TRACKS

1.0 Armadillo Operational Guide

The following procedures provide a simple step-by-step guideline on how to use and operate the Armadillo Above Ground Marker (AGM) HC-1 which is depicted in Figure 1 below.

Figure 1 – Armadillo AGM HC-1

Figure 2 illustrates the features which are on the top of the AGM:

1. LED Light – single multicolour LED light
2. Push Button – Power On/Off
3. 14-Pin Outboard Connector
4. Flow Arrows

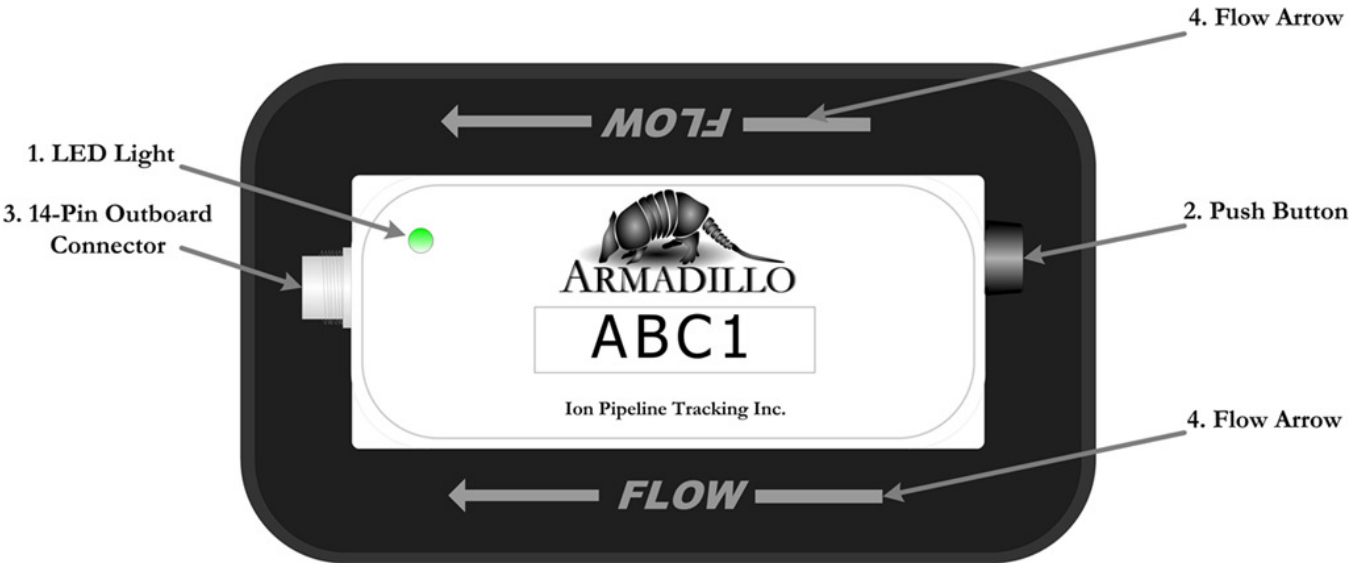


Figure 2 – Armadillo AGM HC-1 Top View

Figure 3 illustrates features which are on the bottom of the AGM:

5. Geophone Brass Ring
6. Charging Posts

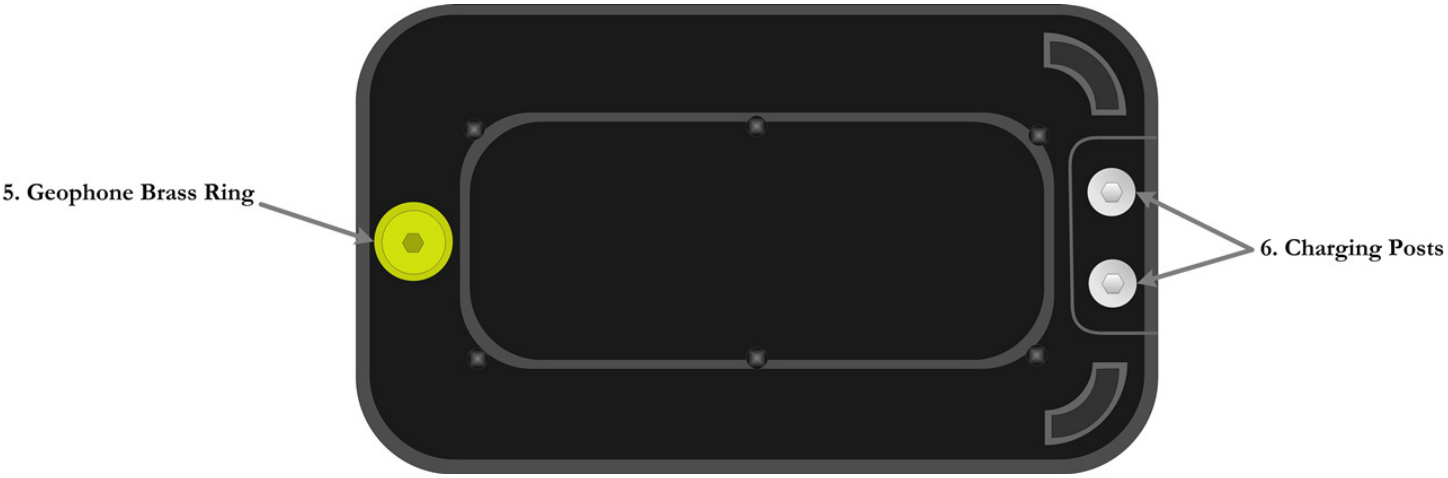


Figure 3 - Armadillo Above Ground Marker (AGM)

When placed above a pipeline, the flow arrows on the AGM should coincide with the flow direction of the fluid within the pipeline as shown in Figure 4 below.

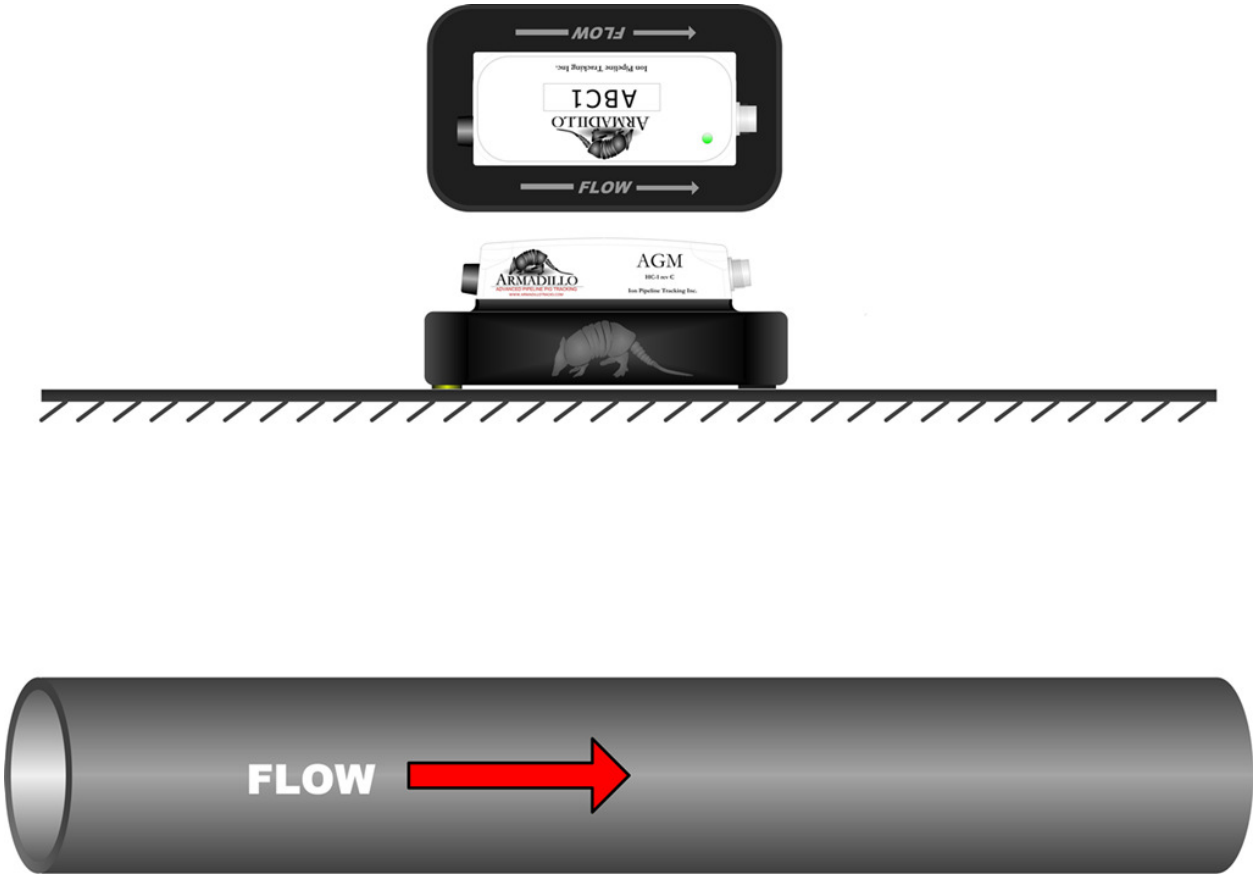


Figure 4 – AGM Flow Arrows Point Downstream

2.0 Operation Procedures

Once the AGM is placed at the Benchmarking location, use the following procedures to operate the AGM:

1. Turn On – Press and hold the button until the AGM starts to Level. The LED light will alternate between pink and green. The amount of time in this state will depend on how electromagnetically noisy the surrounding environment is.
2. The AGM will enter Monitoring mode. There will be a quick green blink every 4 seconds.
3. When the AGM triggers, the LED will rapidly blink green on and off. It will continue doing this while it records a pass.
4. After a pass has been recorded, the LED will now blink a short green followed by a slow red equal to the number of passes detected since the AGM was turned on.
5. Turn Off - Once a pig has been confirmed to have passed the benchmarking location, a user can kneel, press and hold button (approx. 4 seconds) until LED flashes fast pink, release button and the AGM turns off.
    a. User can also kneel, quickly press the button twice (a "double-click"). This will put the AGM into the Ready state, where no monitoring occurs. The user may then pick up the AGM, and press and hold the button to turn off the device.
    b. Why not just pick up the AGM and press and hold button? The AGM is very sensitive to motion and by doing so the user will create a false pass file on the AGM.

A summary of the AGM Operation Guide is available on a business-card sized document. The front side of the card is as shown in Figure below.

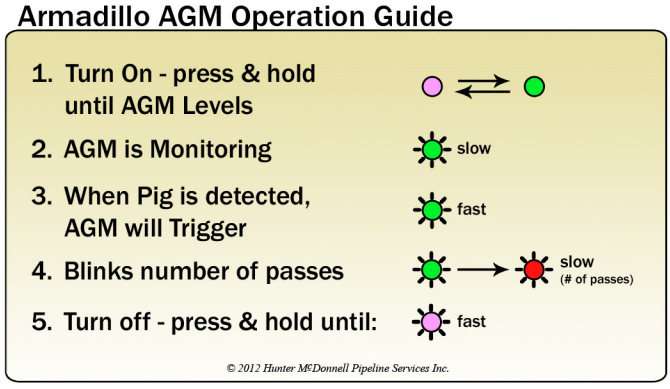


Figure 5 – AGM Operation Guide Card, Front Side

AGM Modes

There are several modes that the AGM can enter into, they include:

1. Charging – Entered by connecting the provided power supply to the AGM connector. The LED will blink orange while the AGM is charging. The LED will become solid orange when the AGM is fully charged. This should be done only when the AGM is off.
2. Software is Connected:
    a. USB: Ensure the AGM is on. Connect a USB cable to the AGM connector. The LED will switch to solid blue indicating a Software connection has been made.
    b. Bluetooth: Ensure the AGM is on. Connect to the AGM using software such as the Armadillo Analyzer. The LED will switch to solid blue indicating a Software connection has been made.
3. Ready – Entered by double clicking the button while in Monitoring or Levelling mode. The LED will become solid pink. While in this mode, the AGM is not monitoring and will not trigger so it can safely be moved.
4. Levelling – Automatically entered when the AGM is turned on, but can also be entered from Ready mode by double-clicking. The AGM is adjusting to its environment in order to detect a pass. Do not move the box or introduce electromagnetic noise into the AGMs environment while this is happening.

    eg: Do not start a truck, stomp the ground or move your cell phone around the AGM.

    The LED will alternate between green and pink while levelling.
5. Monitoring – Automatically entered after the AGM has levelled. There is no way to manually enter this state – the AGM must be allowed to level. The AGM will trigger if it detects a pass while in this mode. The LED will blink green briefly every 4 seconds. If one or more passes have been detected, the LED will blink green once followed by a long red blink for every detected pass.
6. Triggering – Automatically entered when the AGM detects a pass while in Monitoring mode. The LED will rapidly blink green while triggering.

Error States

There are also error states that will prevent the AGM from properly monitoring:

1. No GPS Fix – Denoted by the LED being solid red. The AGM is unable to obtain a GPS fix. Please move the AGM to a location where a GPS fix can be obtained and wait for the AGM to start levelling. Double-click the button to return the AGM to Ready state, and move back to the original location. Double-click again to instruct the AGM to start levelling again.
2. Low Battery – Denoted by an orange LED. Please charge the AGM immediately.

A summary of the AGM modes are also available on a business-card sized document. The back side of the card is as shown in Figure below.

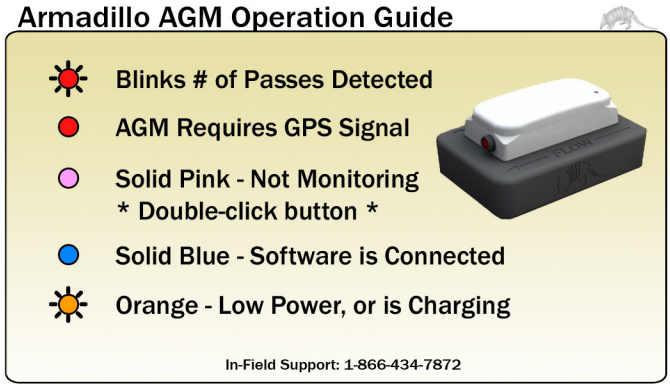


Figure 6 - AGM Operation Guide Card, Back Side

3.0 External Antenna

An external antenna can be attached to the AGM connector. There can be many reasons for using an external antenna. Some examples include:

1. A cleaner signal is required. Placing the external antenna alongside the AGM will produce a more sensitive, cleaner signal.
2. The AGM cannot be placed near the pipeline, but an external antenna on a cable can.
3. You would like antenna information from a location offset to the internal AGM antenna information (upstream or downstream).
4. You want greater sensitivity for a vertical antenna. You would place the external antenna vertically perpendicular to the pipeline by using an antenna stand or by digging a vertical hole to place the external antenna in. This would generate a 'null' antenna waveform to more easily identify the passage time.

External Antenna Procedures

The following procedures describe how to use an external Antenna (see Figure below) with the Armadillo AGM:

1. Attach the External Antenna to the AGM BEFORE turning the power on.
2. Place the AGM where you would like. Typically you would place it over the pipeline, obeying the flow direction instruction on the AGM.
3. Place the External Antenna parallel to the pipeline for a horizontal "peak" waveform (see Figure 7 below) or vertically perpendicular to the pipeline for a vertical 'null' waveform (see Figure 8 below).
4. Turn on AGM. There will now be 3 antennas active: the internal horizontal antenna, the internal vertical antenna, and the external antenna.
5. Documentation is essential to pinpointing the exact passtime. The following form represents the suggested documentation when deploying the external 22 Hz antenna:

Table 1: Armadillo External Antenna Documentation

Variable	Value
Orientation (Horizontal/Vertical)	
Offset between external antenna * and AGM ** reference points	
Position relative to Test Post (Beside/Downstream/Upstream)	

* The reference point for the external antenna is the center line (black line).

** The reference point for the AGM is the center of device.

Note: For figure 7 and 8 there is no offset between the AGM and the external antenna, position is "Beside".

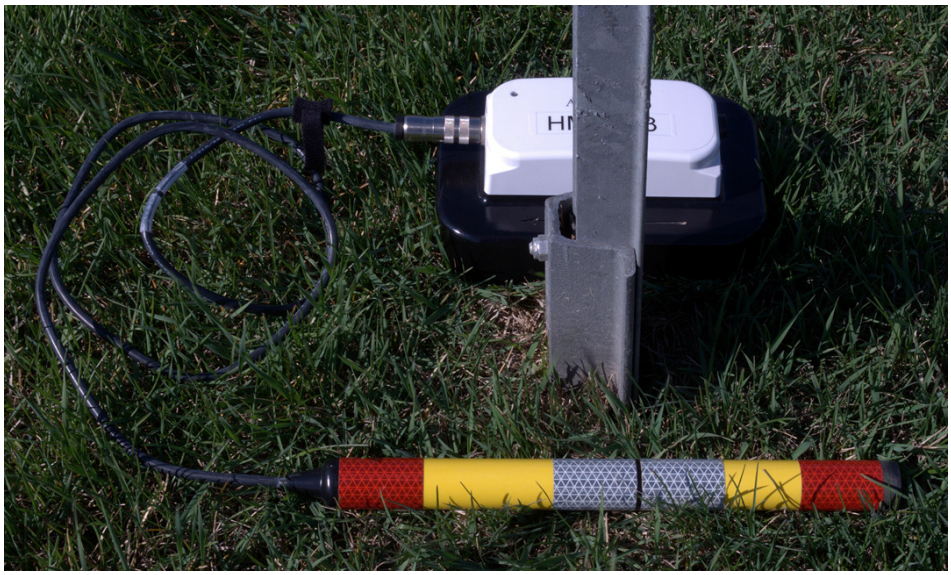


Figure 7 - AGM with External Antenna Attached, Horizontal Orientation.

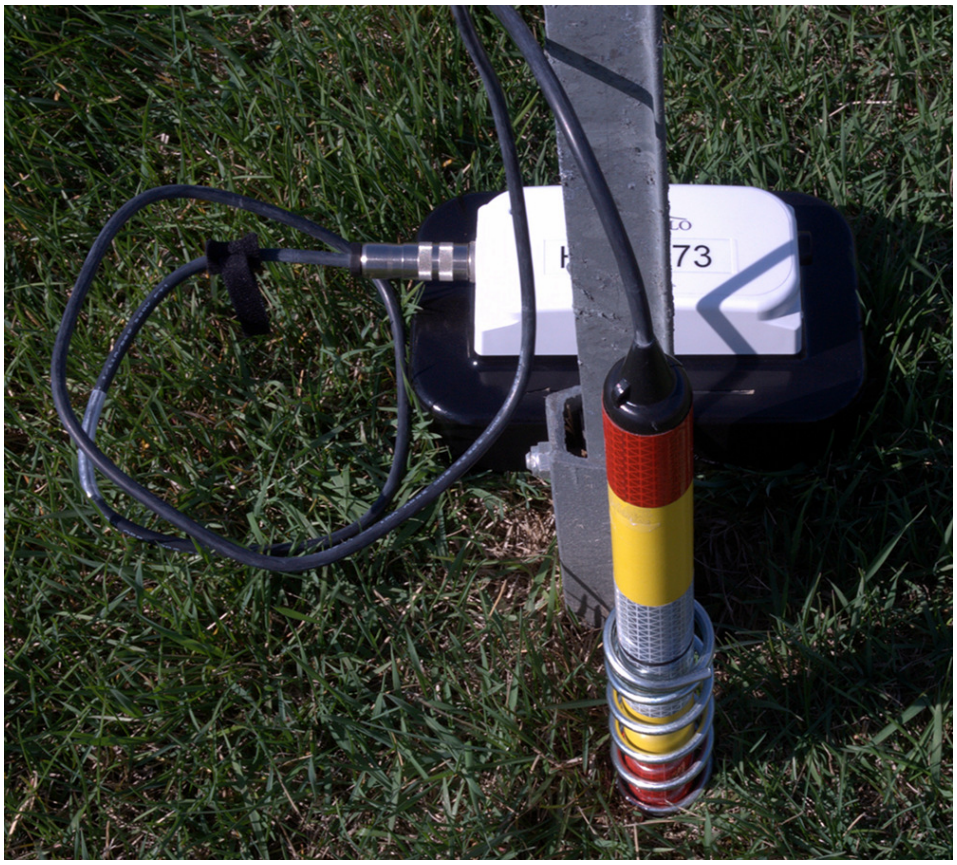


Figure 8 - AGM with External Antenna Attached, Vertical Orientation.

4.0 Notices & Information

PureHM Inc. reserves the right to change the specifications of the hardware and software described in these manuals at any time and without prior notice.

PureHM Inc. will not be held liable for any damages resulting from the use of this product.

While every effort has been made to ensure that the information in these manuals is accurate and complete, we would appreciate it were you to bring any errors or omissions to the attention of PureHM Inc. Any comments about the documentation for this product should be addressed to the manufacturer listed below:

Manufacturer

PureHM Inc.
Bldg 3, 9703 – 45 Avenue
Edmonton, AB, Canada
T6E 5V8

Website: www.armadillotracks.com
Email: info@armadillotracks.com
Tel: 1-866-434-7872
Fax: 1-780-989-0040

Product Information

The product designation is as follows:

- Brand: Armadillo
- Product: AGM
- Model: HC-1

The Armadillo AGM (Above Ground Marker) HC-1 is a pipeline tool monitoring device; specifically it identifies the passage time and above ground passage location of pipeline tools via Magnetic Flux Leakage (MFL), 22Hz, and Geophone (acoustic) sensor data. The AGM monitors and records continuously within Industrial and outdoor environments, utilizes a dual clock system, offers advanced data retrieval, and is capable of local wireless communications.

Local wireless communication utilizes a Class 1, WT11 Bluetooth® 2.0+EDR (Enhanced Data Rates) module. Class 1 equipment can be used anywhere in the EU without restriction. The

Bluetooth module also has a power class 1 rating, signifying a communication range of up to 100 meters. The integrated Bluetooth module is capable of duplex data transmissions and uses an operating frequency range of 2.4 GHz to 2.4835 GHz. The supplied Bluetooth USB dongle provides easy communication between the Armadillo AGM HC-1 and any PC.

Regulatory Information

PureHM Inc. hereby declares that the Armadillo AGM HC-1 is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC. The Declaration of Conformity can be found on www.armadillotracks.com/Downloads/DOC.pdf. The product is compliant with the following standards and/or other normative documents:

EN 301 489-1: V1.8.1: 2008
EN 301 489-17: V2.1.1: 2009
EN 301 489-3: V1.4.1: 2002
EN 300 328: V1.7.1: 2006
EN 300 440-2: V1.4.1: 2010
EN 62311: 2008
EN 60950-1: 2006 +A11:2009 + A1: 2010 + A12: 2011
BS EN 60529: 1992 (Amd 1 & 2) IP67

The Technical Construction File is maintained at the corporate headquarters of PureHM Inc. (address provided above). The Armadillo AGM HC-1 is marked with the CE marking and Notified Body number according to Directive 1999/5/EC:

CE 0889

Under the CE Marking RoHS (Restricted of Hazardous Substances) and WEEE (Waste Electrical and Electronic Equipment) Directives, products are classified within one of ten categories and are further categorized for either household (commercial) or non-household (industrial) use. The Armadillo AGM HC-1 is a non-household Class 9 - Monitoring and Control Instruments Device, which is currently exempt from RoHS. The definition of a Category 9 device is as follows:

Equipment whose primary function is monitoring, control, measurement or test; is placed on the market as a finished product, is not an integral part of a large-scale stationary industrial tool, and is not part of another type of equipment that is outside the scope of Restriction of Hazardous Substances Directive 2002/95/EC.

Where "monitoring" implies a function of a product which measures a variable and then carries out calculations or processes on this data input from sensors, detectors, electrodes or other sources. The European Union (EU) recognizes that these products are manufactured in small numbers and generally have long product lives. Further, they are often used in mission-critical applications where their failure can reasonably be expected to be extremely disruptive, if not catastrophic. Released in July 2006, the Review of Directive 2002/95/EC (RoHS) Categories 8

and 9 – Final Report recommended that Category 8 and 9 products remain exempt from the RoHS directive until 2012 or 2018 depending upon specific product sub-categories and applications.

When you see the below symbol on a PureHM Inc. product, do not dispose of the product with residential or commercial waste as the symbol indicates that this product is to be collected separately.

Some countries or regions, such as the European Union, have set up systems to collect and recycle electrical and electronic waste items. Contact your local authorities in charge of waste management for information about practices established for your region. If collection systems are not available, call PureHM Inc. for assistance.

Customer Support

If you need assistance with the Armadillo AGM HC-1 product, please call the following toll free number, visit the Armadillo website, or send an Email to the address below for solutions and support:

Toll Free: 1-866-434-7872
Website: www.armadillotracks.com
Email: support@armadillotracks.com

Safety

Your PureHM Inc. product and supplies have been designed and tested to meet strict safety requirements. These include Safety Agency approval, and compliance to established environmental standards.

The Armadillo AGM HC-1 is internally powered equipment and the mode of operation is continuous.

This product should only be recharged with the battery charger provided with the device. The AGMs LED will blink orange while the battery is charging. The LED will become solid orange when the battery is fully charged.

Opening the device will void the manufacturer's warranty.

Safety Standards

This PureHM Inc. product is certified by the following Agency using the Safety Standards listed.

Agency:	Nemko Ltd
Safety:	EN60950-1: 2006 +A11:2009 + A1:2010 + A12:2011
Ingress Protection:	BS EN 60529: 1992 (Amd 1 & 2) IP67