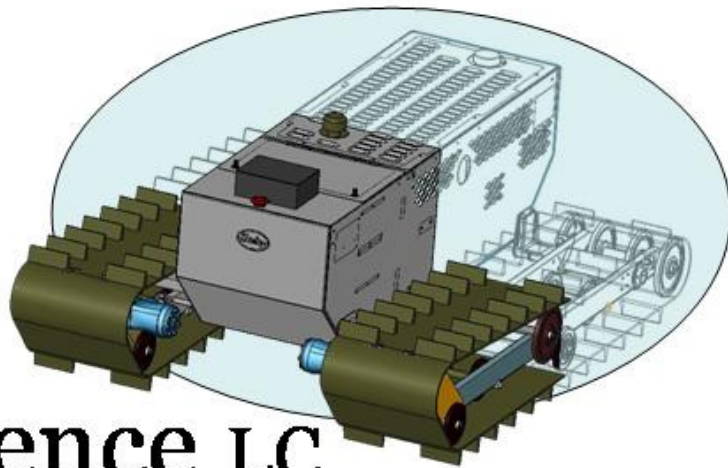


# Operator's Manual Advanced Robotic Manipulator (ARM)



**Invenscience LC**

*The science of invention*

**Invenscience LC**

[www.invenscience.com](http://www.invenscience.com)

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Operator's Manual

**ARM**

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## 1. OVERVIEW

This manual contains important safety precautions and information on the operation, maintenance, care and trouble shooting of your Advanced Robotic Manipulator (ARM).

### **BEFORE OPERATING THE ARM, READ THIS MANUAL IN ITS ENTIRETY!**



**Look for this symbol to indicate important safety precautions and warnings. This symbol indicates "Be alert! Your safety is at risk!"**



**DANGER** indicates a hazard which, if not avoided, will result in death or serious injury.



**WARNING** indicates a hazard which, if not avoided, could result in death or serious injury.



**CAUTION** indicates a hazard which, if not avoided, might result in minor or moderate injury.

## 2. SAFETY

### 2.1 OPERATOR'S RESPONSIBILITIES

- ⇒ Carefully read and follow the rules for safe operation.
- ⇒ Inspect the unit.
- ⇒ Make sure that the operator of the unit knows how to correctly use all standard and accessory equipment.
- ⇒ Operate the unit only with guards, shields, and other safety items in place and working correctly.
- ⇒ Correctly adjust the unit.
- ⇒ Service the unit only with authorized or approved replacement parts.
- ⇒ Complete all maintenance on the unit.

### 2.2 BE CONSCIOUS OF THE ENVIRONMENT

- ⇒ Keep equipment in efficient operating condition.
- ⇒ Dispose of used components properly.
- ⇒ Operate in clear area.



**WARNING: This unit contains mercury in the rotary coupling and must be disposed of properly**

### 2.3 SAFETY RULES

#### 2.3.1 Safety Rules: General Operation

- 1) Read, understand and follow all instructions in the Operator's Manual, on the machine and with any attachments or accessories before starting.
- 2) Only allow responsible adults, who are familiar with the instructions, to operate the unit.
- 3) Be sure the area is clear of other people before operating.
- 4) Stop the machine if anyone enters the area.
- 5) Never leave a machine unattended with the power on. Always stow the unit and turn off power before leaving the machine.
- 6) Turn off power to attachment(s) when transporting or not in use.
- 7) Always wear eye protection when you make an adjustment or repair to the machine.
- 8) Do not operate this machine if you are taking drugs or other medication which can cause drowsiness or affect your ability to operate this machine.
- 9) Do not use this machine if you are mentally or physically unable to operate this machine safely.
- 10) Keep away from moving parts as numerous pinch points exist.



**WARNING: Numerous pinch points exist on the machine. Do not touch the arm or related mechanisms will the machine is powered on or moving. Tragic accidents can occur involving loss of limb or appendage.**

### 2.3.2 Safety: Children



**Tragic accidents can occur if the operator is not alert to the presence of children. Children are often attracted to the machine. NEVER assume that children will remain where you last saw them.**

- ⇒ Keep children out of the operating area and in the watchful care of another responsible adult.
- ⇒ Be alert and turn the unit off if children enter the area.
- ⇒ Never allow children to operate the machine. Instruct children in the potential dangers of the machine.

### 2.3.3 Safety: Service

- ⇒ Keep all nuts and bolts tight. Inspect the unit frequently for wear or damage. Damaged components must be immediately replaced with original equipment parts from an authorized service center. Keep the equipment in good condition.
- ⇒ Never tamper with the safety devices. Check their proper operation regularly.
- ⇒ Stop and inspect the equipment if the vehicle strikes an object. Repair, if necessary, before restarting.
- ⇒ Never make adjustments or repairs with the unit on.
- ⇒ Wait for all movement to stop before servicing any part of the unit.

## 3. OPERATION

### 3.1 SUPPLY POWER

The ARM requires 10A @ 12VDC for operation.

**Powering the unit with reverse polarity will damage the unit.**

### 3.2 CONTROLS

Controls consist of Power Button and PS2 Controller.

#### 3.2.1 Power Button

The ARM is equipped with a master power button that is illuminated when on. Turning this switch off will cut all power to the electronics of the ARM. The ARM will hold position with the power off.

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### 3.2.2 PS2 Controller

The ARM is intended for integrated installation on a vehicle and is equipped with a short range wireless PS2 controller to validate basic operation and function. The controller must be in the "analog" (red light) mode to operate the ARM. The controller powers down automatically when not in use.

The controller consists of two joysticks, two left side triggers and two right side triggers. Following is an explanation of each and the function it controls.

- Left Side Joystick
  - Left position rotates the shoulder joint counter-clockwise
  - Right position rotates the shoulder joint clockwise
  - Up position raises shoulder joint
  - Down position lowers shoulder joint
- Right Side Joystick
  - Up position extends elbow joint
  - Down position retracts elbow joint
  - Left position will extend wrist joint
  - Right position will retract wrist joint
- Triggers
  - L1 rotates wrist counter-clockwise
  - L2 rotates wrist clockwise
  - R1 opens gripper
  - R2 closes gripper

### 3.3 PAYLOAD

The maximum allowable payload for the ARM is 10 pounds at full extension. More weight can be lifted at shorter radii.

### 3.4 STOWING

Properly stow or snub the unit when transporting on vehicles.

## 4. MAINTENANCE

There are no routine maintenance points.

### 4.1 ACCESS PANELS

- ✓ The controls of the arm are housed under the ARM enclosure. Access panels are provided for your protection and to facilitate service of the vehicle.



**WARNING: Never operate the vehicle without all covers, guards and panels properly installed.**

## 5. TROUBLE SHOOTING

### 5.1 ARM DOES NOT MOVE WHEN POWERED

Switch should illuminate when powered. If switch is not illuminated, check source.

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Check connections at rotary connection at base of shoulder joint.  
Verify that controller is in "analog" mode.

If this does not resolve the issue, more serious problems may exist. Consult Invenscience LC at 435-753-8729 or on the web at [www.invenscience.com](http://www.invenscience.com).

## 6. WARRANTY

**Invenscience LC** warrants to the original purchaser that this unit shall be free from defects in material and workmanship under normal use and service for a period of 90 days or 30 hours of run time whichever occurs first.; Subject to the terms and conditions noted in this Limited Warranty, we shall, at our option, repair or replace at no cost to the original purchaser any part covered by this Limited Warranty during the applicable warranty period. No claims involving damage caused from material use, abuse or misuse will be honored.

This **Invenscience LC Limited Warranty** is your exclusive remedy; however, this warranty is void or does not apply to any unit that has been tampered with, altered, misused, abused or used for rental or other commercial and/or professional (non-homeowner) uses. Your warranty does not cover minor mechanical adjustments which are not due to any defect in material or workmanship. For assistance in making such adjustments, consult your Operator's Manual.

To make a claim under this **Invenscience LC Limited Warranty**, return the unit (or if authorized in advance, the defective part) along with your proof of purchase to an Authorized Service Center near you. To locate the nearest Authorized Service Center, call the factory at the number shown below. If you return the entire unit, we will repair the unit. If we authorize the return of the defective part only, we will either replace or repair the part.

This **Invenscience LC Limited Warranty** gives you specific legal rights, and you may also have other rights which vary from state to state. This Limited Warranty is given in lieu of all other expressed and implied warranties including the implied warranty of merchantability and warranty of fitness for a particular purpose. If you need additional information on this written warranty or assistance in obtaining service, call: **INVENSCEINCE LC, 1-435-753-8729 (435-753-TRAX)**