



**SHARK DK-ACU**  
**Attendant Control Unit**

Installation Manual



# About this Manual

This manual has been designed to help you install and configure a Dynamic Controls (Dynamic) SHARK powerchair control system for a 'generic' brand powerchair. For this reason there are no guidelines for specific applications.

This manual should be read in conjunction with the associated power module & remote (control unit) installation manual. Refer to Section 6.1 for a list of Installation Manuals and their part numbers.

If there is a specific requirement for your application, please contact Dynamic Controls or one of the sales and service agents, as we can assist you to configure SHARK for this application.

Throughout this manual there are a few symbols that will help you quickly identify the purpose of the paragraph that follows:



## Notes & Precautions:

Notes provide supporting information for the previous paragraph or section that **should** be followed in order to install, configure, and use the product safely and efficiently.



## Warnings:

Warnings provide important information for the previous paragraph or section that **must** be followed in order to install, configure, and use the product safely and efficiently.



## Programming notes:

This icon denotes that the paragraph refers to the programming of SHARK.

The term '**programming**' used throughout this manual refers to adjusting parameters and configuring options to suit an application. 'Programming' does not change or alter any software within the controller and is performed using a controlled programming tool available only to authorised personnel.

SHARK is not user serviceable. Specialized tools are necessary for the repair of any SHARK component.

Do not install, maintain or operate this equipment without reading, understanding and following this manual – including the Safety and Misuse Warnings – otherwise injury or damage may result.

Due to continuous product improvement Dynamic reserves the right to update this manual. This manual supersedes all previous issues, which must no longer be used.

Dynamic reserves the right to change the product without notification.

Any attempt to gain access to or in any way abuse the electronic components and associated assemblies that make up the powerchair system renders the manufacturer's warranty void and the manufacturer free from liability.

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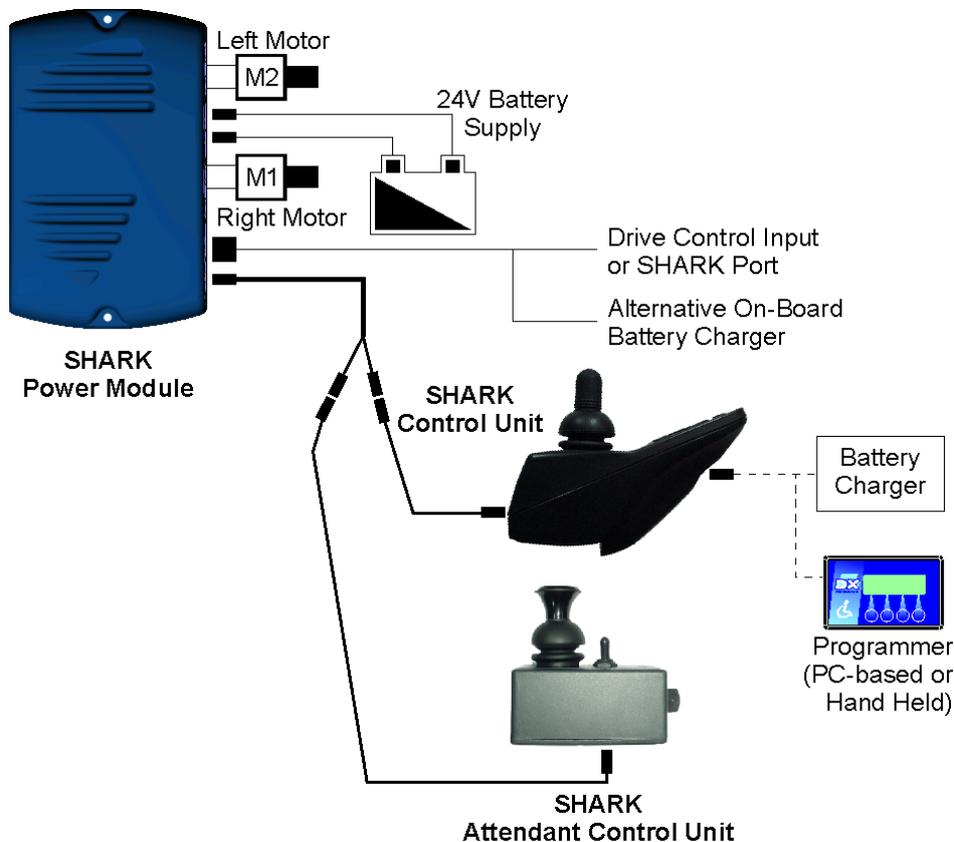
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# 1 Introducing SHARK

SHARK is a lower cost powerchair control solution which, using a dedicated power module and remote, has none of the compromises that go into the design of one-box controllers. This means more power, unrivalled ergonomics, greater versatility and superior usability.

- SHARK features Dynamic's breakthrough "Chair Tamer" technology, providing unprecedented chair performance, control and safety.
- A number of remotes are available to meet a wide range of user needs. These range from optimally small, highly ergonomic units to units with a more traditional appearance and standard functionality.
- A choice of power modules offers basic 'drive only' functionality up through sophisticated modules supporting multiple seat adjustments, lights, etc.
- No heavy power cables running from the armrest to the motors and batteries.
- No hot surfaces for the user to touch.
- A longer and higher current delivery than equivalently rated integral controllers.
- Superior EMC performance due to minimized power wiring.

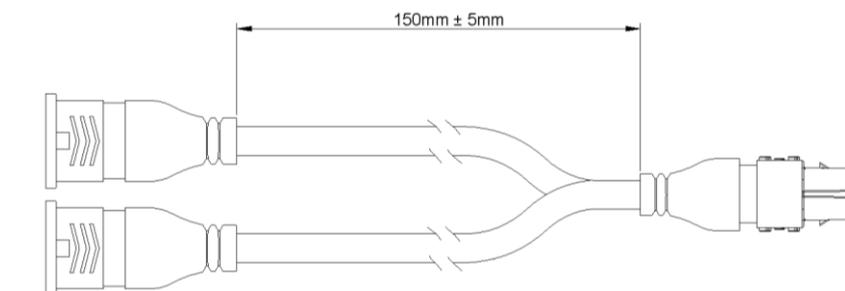


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## 2 The DK-ACU Attendant Control Unit

The DK-ACU Attendant Control Unit is an ancillary unit of a SHARK powerchair control system and provides a convenient method for an attendant to control drive speed and/or actuator function. Featuring a simple user interface comprised of an intuitive speed pot + toggle switch, DK-ACU is a perfect choice for those applications where an attendant needs to control the wheelchair.

DK-ACU connects to a SHARK system via the GSM80951 ACU Connection Cable.



GSM80951

## 2.1 Activating the ACU

The DK-ACU is powered on and off using the On/Off button of the SHARK system remote. Refer to the relevant installation manual for the type of control unit associated with your specific SHARK system for more details.

### Note:



*When neither the SHARK system remote nor the ACU are in use, ensure the power is switched off.*

*The DK-ACU features four LED indicators of which mode the product is in. Ensure these indicators show the required function before moving the joystick.*

### Switching between Attendant Mode and User Mode

#### Attendant Mode



Move the toggle switch to the Attendant Position. The green Attendant LED will light and the user's joystick will become inactive. For some SHARK systems, e.g. those fitted with a DK-REMD control unit, the Attendant Control LED will light indicating to the user that the attendant is now in control. Moving the ACU joystick will cause the powerchair to drive in that direction. The amount of joystick movement will determine the speed that the powerchair will move in that direction.

#### User Mode



Move the toggle switch to the User Position. The green User LED will light and the attendant joystick will become inactive. Moving the user joystick will cause the powerchair to drive as normal.

### Note:



*Moving the toggle switch from user to attendant or attendant to user while the chair is driving will cause the wheelchair to come to a controlled stop before changing over control.*

*Moving the toggle switch while driving will cause the battery gauge to show a left to right 'chase' to show that there is a momentary inhibit condition.*

## 2.2 Adjusting Seat Functions

	<p>When in Attendant Mode, seat functions are available for individual adjustment and are accessed via the Seat Function Button. The SHARK power module dictates the number of actuators available. Press the Seat button once to toggle the control unit from Drive to Seat mode. Seat Function "1" will be active, noted by the green coloured LED "1".</p>
<p>Seat Function 1 Mode</p> 	<p>To adjust Seat Function 1, use the joystick Forward/Reverse.</p> <hr/> <p>To access Seat Function 2 press the Seat Function Button again. Seat Function "2" will be active, noted by the green coloured LED "2".</p> <hr/>
<p>Seat Function 2 Mode</p> 	<p>To adjust Seat Function 2, use the joystick Forward/Reverse.</p> <p>Moving the joystick right while in Seat Function 1 also selects Seat Function 2.</p> <p>Moving the joystick left while in Seat Function 2 also selects Seat Function 1.</p> <p>Pressing the Seat Function Button again (3 presses are a complete cycle) puts the Attendant Control back in Drive Mode. Use the joystick to control speed and direction as normal.</p>

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## 2.3 Speed Pot

	<p>The Speed Pot adjusts the overall speed/response of the chair while in Attendant Mode.</p> <p>Clockwise provides maximum programmed performance while counterclockwise results in minimum programmed performance.</p>
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## 2.4 Function Memory

In order to reduce the number of button presses required to access the most common features, the DK-ACU remembers what function was being used when switching out of attendant mode.

If the attendant is in actuator mode and the toggle switch is moved to User, the Shark system will remember this condition. When the toggle switch is moved back to the attendant position, the attendant will return to seat function mode.

Similarly, if the User is operating a seat function when the toggle switch is moved to attendant, the Shark system will remember this condition. When the toggle switch is moved back to User position, the User will return to seat function mode.

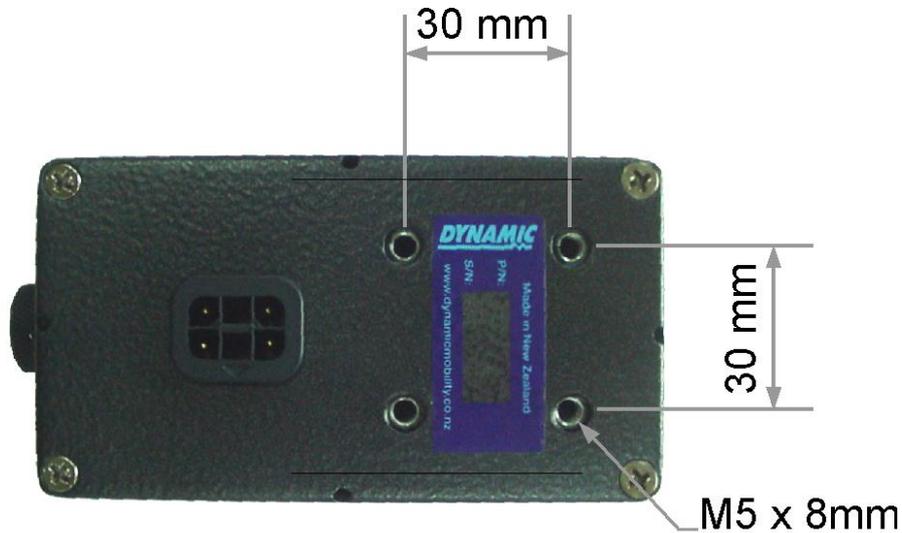
Switching the system off then on will always cancel this memory and both the user and attendant will always default to drive mode.

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## 3 Installation and Testing

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### 3.1 Attendant Control Unit Mounting



The SHARK Attendant Control Unit can be mounted on either side of the wheelchair, in an upright position using four M5 screws. These should be tightened to a torque of approximately 3 Nm (27 lbf in).



**Note:**

For safe installation of any of the mounting options, select a screw length that protrudes between 5mm and 8mm into the case.

To maximize the driving control for the attendant, a reference to a fixed point of the wheelchair should be considered in addition to suitable programming. This fixed point may be a handle or similar. The installation of such a point of reference would help prevent the attendant's hand moving independently of the joystick.

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### 3.1.1 DK-ACU Connection Cable

When using an Attendant Control Unit with an existing SHARK system, the SHARK Power Module communicates to the DK-ACU through the ACU Connection Cable (GSM80951). This cable features a modular 'keyed' connector that can only be plugged in one way – the Control Unit symbol on top of the plug should be facing up. One end of the connector plugs into the control unit, the other plugs into any SHARK power module.

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## 3.2 Testing

To ensure that the powerchair meets a minimum level of safety, the following procedure should be undertaken. This procedure should be carried out in a spacious environment and with due regard to any possible unexpected powerchair movement in the event of faulty installation.

1. Raise the wheels off the ground using blocks under the powerchair frame so that the wheels can turn freely.
2. Recheck all wiring, paying particular attention to polarities of batteries, motors and park brakes.
3. Make the final connection to the Battery Positive (+) terminal and close the circuit breakers.
4. Ensure the DK-ACU toggle switch is in User position and press the Power button to turn SHARK on. Ensure it turns on correctly and the green User LED on the DK-ACU is lit.
5. Press the Power button again to turn SHARK off. Ensure it turns off correctly. Press the power button again to turn SHARK back on.
6. Turn each drive wheel by hand to check that the park brakes are engaged. The wheels should not move.
7. Push the joystick on the remote slightly out of neutral and listen for the "click" as the park brakes disengage.
8. Select and operate all available seat functions and ensure they operate as intended and in the correct direction,
9. With the DK-ACU toggle switch in User Mode, move the user joystick in all directions and ensure that the wheels respond smoothly and in the correct direction.
10. Move the DK-ACU toggle switch to Attendant Mode and move the attendant joystick in all directions. Ensure the wheels respond smoothly and in the correct direction.
11. Release the joystick to neutral and listen for the "click" of the park brakes re-engaging.
12. Select and operate all available seat functions and ensure they operate as intended and in the correct direction,

13. If the wheelchair has "swivel" functionality, repeat tests 4 to 12 inclusive with the wheelchair in the swiveled orientation and ensure all functions
14. Turn off SHARK and remove the blocks from under the powerchair.
15. Turn SHARK back on and set maximum speed to its minimum value.
16. Drive the powerchair in all directions slowly, checking for precise and smooth control.
17. Repeat at higher speeds.
18. Drive the wheelchair on a 1 : 6 ramp and check for normal power, smoothness and parking.
19. Repeat testing as required until chair performance is as expected.

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## 4 Programming DK-ACU

### **Warning:**

*Performance adjustments should only be made by professionals in the health care field or by persons fully conversant with the adjustment process and the user's capabilities.*

*Incorrect settings, or programming in an unsafe location, could cause injury to the operator or bystanders, or damage to the vehicle or surrounding property.*

*After the vehicle has been configured, check to make sure the vehicle performs to the specifications entered in the programming procedure. If the vehicle does not perform to specifications, reprogram it. Repeat this procedure until the vehicle performs to specifications. If the intended operation cannot be achieved, contact your service agent.*

*Ensure that deceleration parameters are always higher than acceleration parameters for a safe response.*

*It is the health care professionals responsibility to ensure that the user is capable both of cognitively understanding and physically operating the programmed features and functions.*

*With inappropriate programming settings, certain features and options may not be accessible or perform as expected.*



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### 4.1 Introduction

SHARK is fully programmable to provide superb performance for a wide variety of powerchair configurations and users. All programmed values are stored in the Power Module. In the event that the Control Unit is replaced, there is no need to reprogram SHARK.

For information regarding the full range of programmable features for any SHARK system, please refer to the appropriate power module installation manual (refer Section 6.1 for a list of manuals and their part numbers).

The SHARK system is designed to automatically detect the DK-ACU when connected - no additional programming is required to enable the system to "see" the Attendant Control. However, an "Attendant Profile" is available to configure default chair acceleration, deceleration, and turn settings while the system is in Attendant Mode. These programmable parameters may be accessed with either Wizard or the Hand Held Programmer.

The SHARK power module can be programmed to allow alternative mounting options. Refer to the power module installation manual.

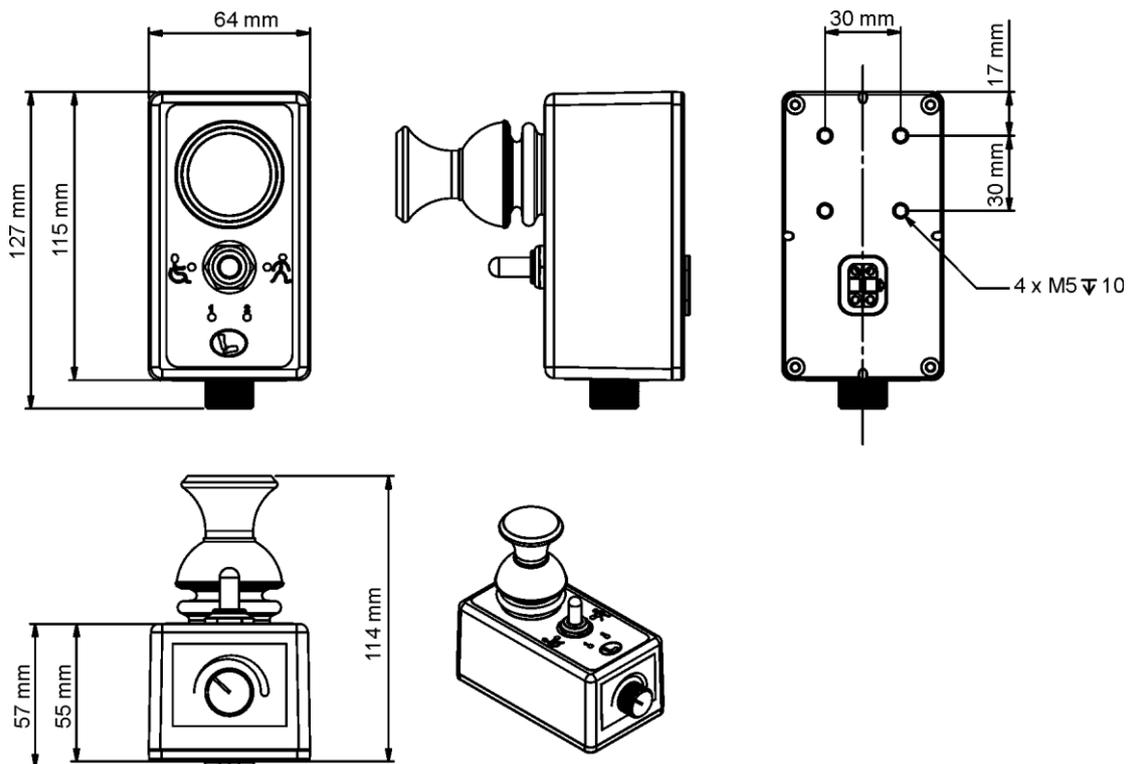
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## **4.2 DK-ACU Compatibility**

The SHARK system supports several different types of power modules. The DK-ACU is not compatible with all SHARK power modules. Please contact your local Dynamic representative for more information regarding your specific system and compatibility questions.

# 5 Physical Specifications

Parameter	SHARK Control Unit			
Material	Metal, Aluminium			
Protection Rating	IPx4			
Weight	350 grams			
	Min	Nominal	Max	Units
Force required to operate joystick			800	grams
Force required to operate buttons	100		300	grams
Operating Temperature Range	-25		50	°C
Operating Temperature Range – SHARK Programming Adapter	0		50	°C
Storage Temperature Range	-40		65	°C
Operating Humidity Range	0		90	%RH



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# 6 Appendices

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## 6.1 Accessories + Parts List

### Dynamic SHARK Installation Manuals

Part Description	DCL Part #	Qty/Unit
Dynamic SHARK DK-PM(x) Installation Manual	GBK80262	1
Dynamic SHARK DK-REMA Installation Manual	GBK80260	1
Dynamic SHARK DK-REMB Installation Manual	GBK80261	1
Dynamic SHARK DK-REMD Installation Manual	GBK80258	1
Dynamic SHARK DK-ACU Installation Manual ( <i>This Manual</i> )	GBK80257	1



For a comprehensive list of programming and wiring information for the SHARK system, refer to the Power Module Installation Manual (GSM80262).

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## 6.2 **Intended Use and Regulatory Statement**

### **Intended Use**

The Attendant Control Unit (DK-ACU) is a module of the Shark wheelchair control system, intended to allow operation of drive and/or actuator(s) by an attendant. The attendant can adjust the drive speed and return control to the user from the DK-ACU.

The wheelchair manufacturers are provided with all the integration, set-up, operating environment, test and maintenance information needed in order to ensure reliable and safe use of the controller.

### **Device Classification**

#### **Europe**

The SHARK Controller is a component of a Class I medical device as detailed in the Council Directive 93/42/EEC concerning Medical Devices.

#### **USA**

The SHARK Controller is a component of a Class II medical device (Powered Wheelchair) as detailed in 21 CFR § 890.3860.

### **Compliance and Conformance with Standards**

In accordance with the device classification, the SHARK wheelchair controller is designed to comply with the requirements of the European Medical Device Directive 93/42/EEC and 21 CFR § 820.30.

The SHARK Controller has been designed such that the combination of the wheelchair and the SHARK Controller, along with accessories as applicable, complies with the requirements of the MDD Harmonized standards EN12184 and EN12182 and the FDA Consensus standard ISO 7176 for performance.

However, final compliance of the complete wheelchair system with international and national standards is the responsibility of the wheelchair manufacturer or installer.

### **SHARK Programming Adapter (DK-ADAPT)**

The Shark programming adapter is intended to allow the Shark Controller series of power wheelchair controllers to communicate with the DX Hand Held Programmer (DX-HHP) and Wizard. The adapter is not intended to alter the controller in any way, but simply passes information to and from the controller. The information passed may alter the controller performance. The Shark Programming adapter does not interface to the DK-ACU.

The intended power source is a 24V battery supply via the charger connector of the Shark controller. The intended environment is indoors, or outdoors in dry conditions.

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## 6.3 Maintenance

1. All vehicle components should be regularly checked for loose, damaged or corroded connectors, terminals, or cabling. All cables should be restrained to protect them from damage. Damaged components should be replaced.
2. All switchable functions on the Dynamic electronics system should be regularly tested to ensure they function correctly.
3. All Dynamic electronic components should be kept free of dust, dirt and liquids. If necessary, wipe with a cloth dampened with warm water. Do not use solvents or abrasive cleaners.
4. There are no user-serviceable parts in any Dynamic electronic component. Do not attempt to open any case, or undertake any repairs, or warranty claims will be affected.
5. Where any doubt exists, consult your nearest service center or agent.



**Warning:**

*If any component is damaged in any way, or if internal damage may have occurred (for example by being dropped), have it checked by qualified personnel before operating.*

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## 6.4 Warranty

All equipment supplied by Dynamic Controls is warranted by the company to be free from faulty materials or workmanship. If any defect is found within the warranty period, the company will repair the equipment, or at its discretion, replace the equipment without charge for materials and labor.

This Warranty is subject to the provisions that the equipment:

- has been thoroughly checked upon completion of installation, and all programmable options correctly adjusted for safe operation prior to use.
- has been correctly installed.
- has been used solely in accordance with this manual.
- has been properly connected to a suitable power supply in accordance with this manual.
- has not been subjected to misuse or accident, or been modified or repaired by any person not authorized by Dynamic Controls.
- has been used solely for the driving of electrically powered wheelchairs in accordance with the wheelchair manufacturer's recommendations.

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## 6.5 Safety and Misuse Warnings

### Warnings to be included in the User Manual

The following warnings are applicable to the installer and must be passed on to the end-user before use of the product.

- *Do not install, maintain or operate this equipment without reading, understanding and following the proper instructions and manuals, otherwise injury or damage can result.*
- *No user-serviceable parts inside.*
- *A warning must be conveyed to the operator that he or she has the responsibility to ensure that the vehicle is kept in a good safe operating condition, and to ensure that components, such as cables, are protected from damage by securing them in optimum positions.*
- *A warning must be conveyed to the operator that the controller could cause the vehicle to come to a sudden stop. In situations where this might affect the safety of the operator, the fitting and wearing of a seat belt is required.*
- *Performance adjustments should only be made by professionals in the health care field or by persons fully conversant with the adjustment process and the operator's capabilities. Incorrect settings, or programming in an unsafe location, could cause injury to the operator or bystanders, or damage to the vehicle or surrounding property.*
- *Performance adjustments should only be made indoors, or outdoors in dry conditions.*
- *The user should turn the system off before getting in and out of the vehicle.*
- *Do not operate the vehicle if it behaves erratically, or shows abnormal response, heating, smoke or arcing. Turn the system off at once and consult your service agent.*
- *If the vehicle drives without demand, press the Power button on the SHARK remote.*
- *Ensure that the battery charger used with SHARK is pin-compatible for drive inhibit. Consult your dealer or vehicle manufacturer.*
- *If the vehicle speed surges when going down hill, the common reason is the operation of an over-voltage protective device. When running down hill, the braking energy from the motor is sent to the battery, which charges it. However, if the battery is fully charged, it cannot accept the generated energy without dramatically increasing its voltage. If this over-voltage condition were allowed to continue, there would be a risk of damage to the battery or an explosion. To prevent these risks, the controller forces the vehicle to slow down until the battery voltage drops to a safe level, after which it allows the vehicle to speed up again. To prevent speed surging with charged batteries, we advise operators to descend hills slowly.*
- *No connector pins should be touched, because contamination or damage due to electrostatic discharge might result.*
- *The controller should not be stored or operated outside of the minimum or maximum temperature ranges specified in this manual.*

- *Most electronic equipment is influenced by radio frequency interference (RFI). Caution should be exercised with regard to the use of portable communications equipment in the area around such equipment. While Dynamic Controls has made every effort to ensure that RFI does not cause problems, very strong signals could still cause a problem. It is the responsibility of the vehicle manufacturer to ensure that the vehicle is tested in accordance with local EMC regulations.*
- *If RFI causes erratic behavior, turn the vehicle off immediately. Turn the vehicle off before using cell phones or portable communications devices.*
- *In the event of the fault indicator flashing while driving, the operator must ensure that the system is behaving normally. If the system is not behaving normally the system must not be used and a service agent contacted.*
- *Under certain conditions, the controller may shut down leaving the user stranded. In all cases, the user must be able to summon assistance.*
- *Turn the system off when not in use.*

### **Service and Configuration Warnings**

The following warnings are applicable to the installation technician only.

- *After the vehicle has been configured, check to make sure the vehicle performs to the specifications entered in the programming procedure. If the vehicle does not perform to specifications, reprogram it. Repeat this procedure until the vehicle performs to specifications. If the intended operation cannot be achieved, contact your service agent.*
- *The completed installation must be thoroughly checked, and all programmable options correctly adjusted, for safe operation prior to use.*

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## 6.6 Electromagnetic Compatibility (EMC)

Dynamic Electronic Controllers have been tested on typical vehicles to confirm compliance with the following appropriate EMC standards:

USA: ANSI/RESNA WC/Vol:2 - 1998 Sec 21

Europe: EN12184:1999 Sec 9.8.1-3

National and international directives require confirmation of compliance on particular vehicles. Since EMC is dependent on a particular installation, each variation must be tested. The guidelines in this section are written to assist with meeting EMC requirements.

### Minimizing Emissions

**Motors:** Motor brushes generate electromagnetic emissions. It may be necessary to fit capacitors between the brush holders and motor case. Ensure the leads are kept as short as possible.

A suitable capacitor is 4n7, 250V Polypropylene.

**Wiring:** Keep wire lengths as short as practical for a tidy layout.

Minimize any wire loops, particularly loops of single wires as opposed to wire pairs.

Endeavor to run wires in pairs or bunches.

Where practical, tie cables to wheelchair frame.

### Immunity to Radiated Fields

Follow the wiring recommendations for minimizing emissions.

### Immunity to ESD

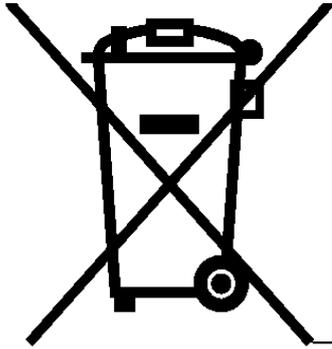
Follow the wiring recommendations for minimizing emissions.

Ensure all vehicle sub-frames are electrically connected.

Do not leave connections unnecessarily exposed.

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## 6.7 Environmental Statement



This product has been supplied from an environmentally aware manufacturer.

Please be environmentally responsible and recycle this product at the end of its life through your local recycling facility.

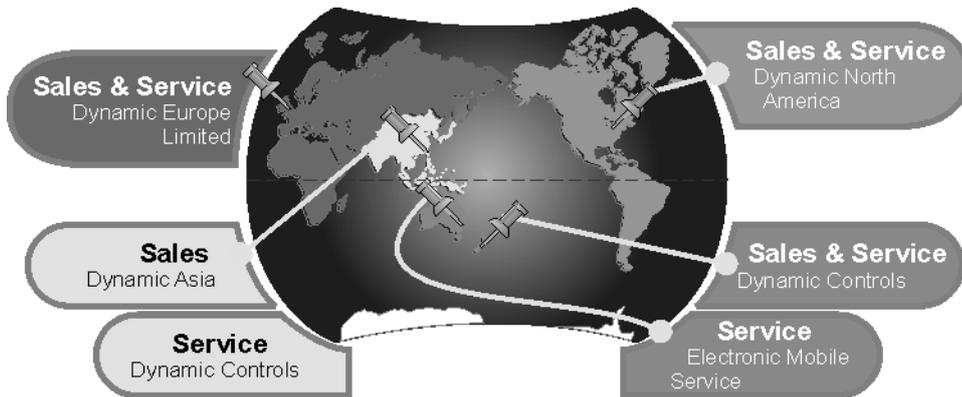
This product may contain substances that could be harmful to the environment if disposed of into a landfill.



## 6.8 Contact Details

Dynamic has a global network of sales and service centers. Please contact your nearest Dynamic representative for Sales and/or Service advice, or contact us directly through our web site:

[www.dynamicmobility.co.nz](http://www.dynamicmobility.co.nz)



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