



## **DX Environmental Control Unit**



**(Part No. DX-ECU)**

### **Installation Manual**

GBK64227 issue 4 September 2004

**Important Notes:**

1. Read this Manual carefully before installing or operating your DX control system.
2. Due to continuous product improvement Dynamic reserves the right to update this Manual.  
This manual supersedes all previous issues which must not continue to be used.
3. Any attempt to gain access to or in any way abuse the electronic components and associated assemblies that make up the wheelchair control system renders the Manufacturer's Warranty void and the Manufacturer free from liability.

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# 1 INTRODUCTION

A DX based wheelchair control system may comprise between two and sixteen DX compatible modules depending on the application. Each DX compatible module has its own Installation Manual describing the installation requirements of that particular module.

This Manual describes the installation of the Environmental Control Unit (DX-ECU) only and should be read in conjunction with the installation manuals for all other DX Modules to be used in your system.

A DX-ECU compatible DX Master Remote must be used with the DX-ECU.

Dynamic Controls welcomes feedback from its customers on its products and documentation. If you would like to comment on this manual or the product it describes, please contact us at any of the addresses at the back on this manual or by email at:

**[info@dynamic-controls.co.nz](mailto:info@dynamic-controls.co.nz)**

## **2 PRODUCT DESCRIPTION**

The DX-ECU is an optional sub-component providing relay switch contacts controlled by the wheelchair users input device.

The DX-ECU contains eight relay switch contacts. Some DX-Systems can support two DX-ECU modules, thereby providing up to 16 relay switch contacts in total. A 2-pin Molex socket is provided to select between ECU1 and ECU2.

The ECU relay switch contacts are isolated from the wheelchair supply and may be used to control on-chair devices. The DX Master Remote determines the availability and functionality of the DX-ECU.

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## 3 INSTALLATION

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### **Electromagnetic Compatibility (EMC)**

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

Emissions:	CISPR22, class B
Susceptibility:	IEC1000-4-3
ESD:	IEC1000-4-2
Compliance levels and set-up as per ISO 7176, part 21.	

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

#### **Minimising Emissions**

**Motors :** Motor brushes generate electromagnetic emissions. It may be necessary to fit capacitors between the brush holders and the motor case. Ensure the leads are kept as short as possible.  
A suitable capacitor is 4n7, 250V Ceramic.

**Wiring :** Keep wire lengths as short as practical for a tidy layout.  
Minimise any wire loops, particularly loops of single wires as opposed to wire pairs.  
Endeavour to run wires in pairs or bunches.  
Where practical, attach cables to the wheelchair frame.

#### **Immunity to Radiated Fields**

Follow the wiring recommendations for minimising emissions.

#### **Immunity to ESD**

Follow the wiring recommendations for minimising emissions.  
Ensure all vehicle sub-frames are electrically connected.  
Ensure any metal casing on speed setting potentiometers is electrically connected to the vehicle frame.  
Do not leave connections unnecessarily exposed.

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## General

Installing an ECU requires the following steps:

1. Mounting and securing the ECU
2. Connecting the ECU to the rest of the DX system
3. Connecting devices to the ECU

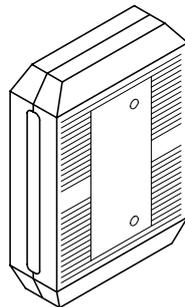
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## Mounting

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### Environmental Protection

Maximum environmental protection is achieved when the ECU is mounted with the connectors facing down as shown.



### Recommended Mounting Orientation

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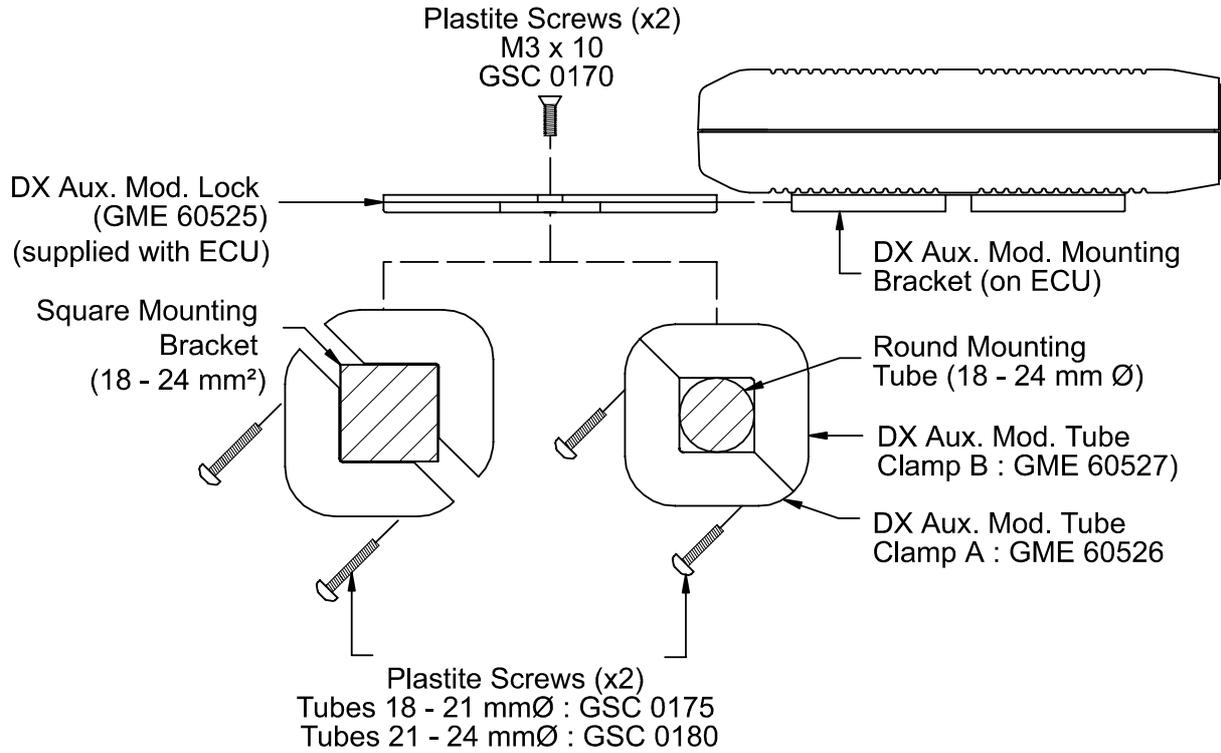
**Note :** The ECU is not water proof and must be protected from water ingress as appropriate to chair usage and mounting considerations. Typically water proofing is achieved by a sensible choice of mounting position and / or addition of a water shielding cover.

The ECU should be mounted in a position that is not exposed to mechanical abuse.

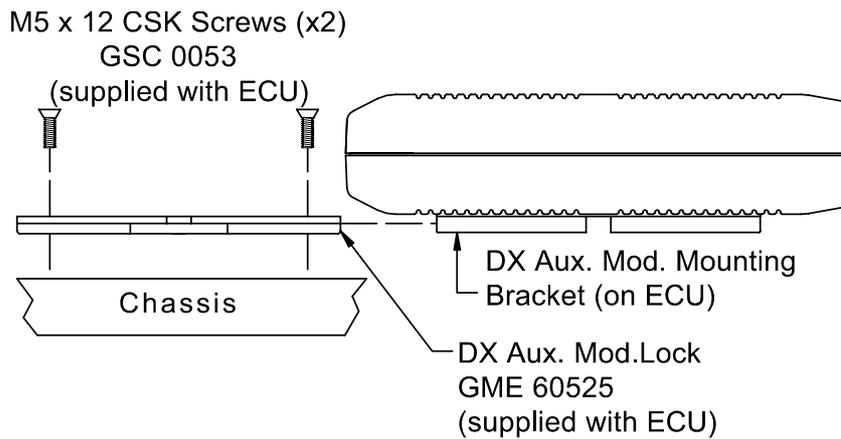
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## Securing the ECU

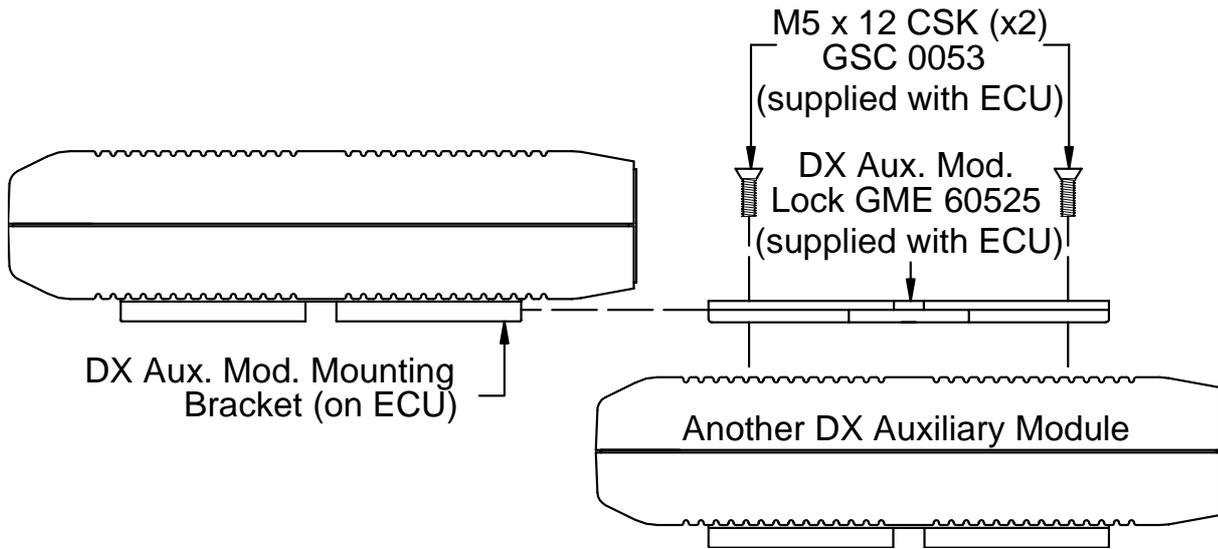
The ECU is supplied fitted with a DX Auxiliary Module Mounting Bracket. This allows the ECU to be chassis mounted, tube mounted, or mounted to another DX Auxiliary Module as follows:



### Round or Square Tube Mounting



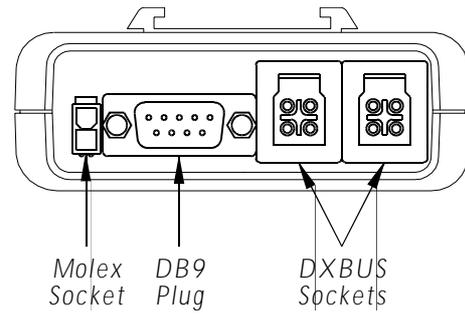
### Chassis Mounting



### Mounting on other Auxiliary Modules

## ECU Connection to the DX System

The ECU can be connected to any other DX Module existing in the DX system by way of the two DXBUS connectors.



## Environmental Control Connections

### DB9 Connector

Any suitable Environmental Control Device can be connected into your DX system by way of a DB9 plug socket as shown in Figure 6.

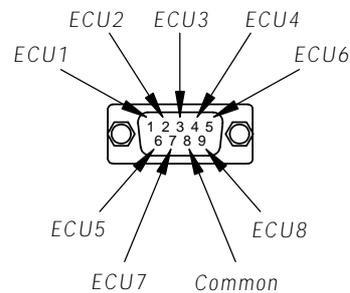


Figure 6 – ECU DB9 Connections



**Warning:**

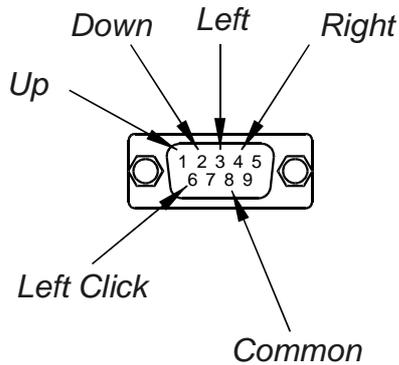
The switch contacts in the ECU are rated for 24V, 1A operation only. The DB9 common contact is rated for 2A only. Do not exceed these ratings in operation. In particular, **do not connect the ECU to AC mains.**



**Warning:**

DX-ECU control of safety critical equipment, life-sustaining equipment, equipment for medical treatment or measurement systems to control treatment is not recommended.

For a typical example of Mouse Mover connection to the ECU, see Figure 7.



**Figure 7** – Typical ECU Mouse Mover Connections

## Molex Connector

A maximum of two ECU Modules can be connected into specific DX system. These are nominally labelled ECU1 and ECU2. In order to define which Module is ECU1 or ECU2, the Molex socket is used.

Supplied with the ECU is a Molex plug which, when fitted into the Molex socket, will effectively tell the DX system that it is ECU2.

When the DX System is powered up, the ECU(s) is designated an ID (ECU1 or 2 depending whether the Molex plug is inserted) and the relevant LED is lit.

**Note :** Care should be taken when looming for the ECU and other DX modules that wires can not be transposed.

Molex Connector not used → ECU1  
 Molex Connector used → ECU2



**Warning:**

*Do not use the frame of a wheelchair or scooter as the earth return for any lights or actuators. Making any low resistance connection to the frame is regarded as a possible safety hazard and not allowed by international performance and safety standards for wheelchairs and scooters.*

*Ensure that all wiring is suitably restrained and of such a length that it is physically impossible to connect the motor directly to the battery.*

## 4 INTENDED USE AND REGULATORY STATEMENT

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### Intended Use

The DX-ECU is intended to provide an interface to 3rd party equipment such as environmental controls and communication devices by means of relay switch contacts. It is not intended to operate life support and safety critical devices.

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### Device Classification

The DX-ECU is an optional sub-component of the DX system and requires appropriate installation and set-up as part of the wheelchair.

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### Compliance and Conformance with Standards

In accordance with the device classification, DX-ECU is designed to comply with the requirements of the European Medical Device Directive and conforms to EN12182.

The DX-ECU has been designed such that the combination of the wheelchair controller and components complies with the requirements of EN12184 & ISO7176. However, final compliance of the complete wheelchair system with international and national standards is the responsibility of the wheelchair manufacturer or installer. The selection and fail-safe operation of 3rd party equipment is the responsibility of the installer.

Particular attention should be paid to the wheelchair controller installation manual(s) with respect to:

Product Disclaimer

Electro Magnetic Compatibility

Maintenance

Safety & Misuse Warnings

## 5 MAINTENANCE

- The DX System should be regularly checked for integrity. Loose, damaged or corroded connectors or terminals, or damaged cabling should be replaced.
- All switchable functions on the DX System should be regularly tested to ensure they function correctly.
- All DX System components should be kept free of dust, dirt and liquids. If necessary wipe with a cloth dampened with warm water or alcohol. **Do not** use solvents or abrasive cleaners.
- Where any doubt exists, consult your nearest Service Centre or Agent.
- There are no user-serviceable parts in any DX System component - do not attempt to open any case.



**Warning:**

*If any DX 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 SAFETY AND MISUSE WARNINGS

- Do not install, maintain or operate this equipment without reading, understanding and following the proper instructions and manuals, otherwise injury or damage may result.
- The completed installation must be thoroughly checked, and all programmable options must be correctly adjusted for safe operation prior to use.
- A warning must be conveyed to the wheelchair operator that the controller could cause the chair to come to a sudden stop. In situations where this may affect the safety of the user, this will require the fitting and wearing of a seat belt.
- Performance adjustments should only be made by professionals of the health care field or persons fully conversant with this process and the drivers capabilities. Incorrect settings could cause injury to the driver, bystanders, damage to the chair and surrounding property.
- After the wheelchair has been set up, check to make sure that the wheelchair performs to the specifications entered in the programming procedure. If the wheelchair does not perform to specifications, turn the wheelchair off immediately and re-program. Repeat procedure until the wheelchair performs to specifications.
- If a wheelchair is programmed with settings other than default, under some very rare fault conditions default settings could be automatically restored, thereby changing driving characteristics. This in turn could lead to a chair moving in a direction or speed that is not intended. Programmers should consider this risk when programming settings other than default.
- A warning must be conveyed to the operator that they have the responsibility to ensure that the vehicle is kept in a good safe operating condition, and ensure that components, such as cables, are protected from damage by securing them in optimum positions.
- Do not operate the DX System if it behaves erratically, or shows abnormal response, heating, smoke or arcing. Turn the system off, disconnect the battery or open the battery overload switch, and consult your Service Agent.
- Do not operate your DX System if the battery is nearly flat as a dangerous situation may result due to loss of power in an inopportune place.

- Ensure the controller is turned off when not in use.
- The user must turn the system off while getting in and out of the wheelchair.
- No connector pins should be touched, as contamination or damage due to electrostatic discharge may result.
- Users and Suppliers of Assistive Mobility products should give consideration to the possibility of a failure to operate, or an incorrect operation, by the product. Should an operator be left with limited or no mobility due to an equipment failure, they should still be able to summon assistance from where ever they may be.
- 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 the manufacturer has made every effort to ensure that RFI does not cause problems, very strong signals could still cause a problem. If RFI causes erratic behaviour, shut the wheelchair off immediately. Leave off while transmission is in progress.
- In the event of a fault indicator flashing while driving (battery gauge and/or Status LED), the user must ensure that the system is behaving normally. If not, the system must be turned off and a service agent contacted.
- The switch contacts in the ECU are rated for 24V, 1A operation only. The DB9 common contact is rated for 2A only. Do not exceed these ratings in operation. In particular, do not connect the ECU to AC mains.
- DX-ECU control of safety critical equipment, life-sustaining equipment, equipment for medical treatment or measurement systems to control treatment is not recommended.

Report any malfunctions immediately to your Service Agent.

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## Disclaimer

Dynamic Controls products built today allow our customers' vehicles to conform to national and international requirements. In particular to:

- ISO7176, part 9 - Climatic Tests for Electric Wheelchair;
- ISO7176, part 14 - Power and Control Systems for Electric Wheelchairs;

ISO7176, part 21 - Requirements and Test Methods for  
Electromagnetic Compatibility of Electric  
Powered Wheelchairs and Scooters

However, the performance of controllers fitted to wheelchairs and scooters is very dependant on the design of the wheelchair so final the vehicle manufacturer for their particular vehicle must obtain compliance. No component compliance certificate issued by Dynamic Controls relieves a wheelchair / scooter manufacturer from compliance testing their particular vehicles.

If Dynamic Controls controllers are fitted to vehicles or applications other than wheelchairs or scooters, testing to appropriate standards for the particular application must be completed, as ISO7176 may be inappropriate.

## **7 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 labour.

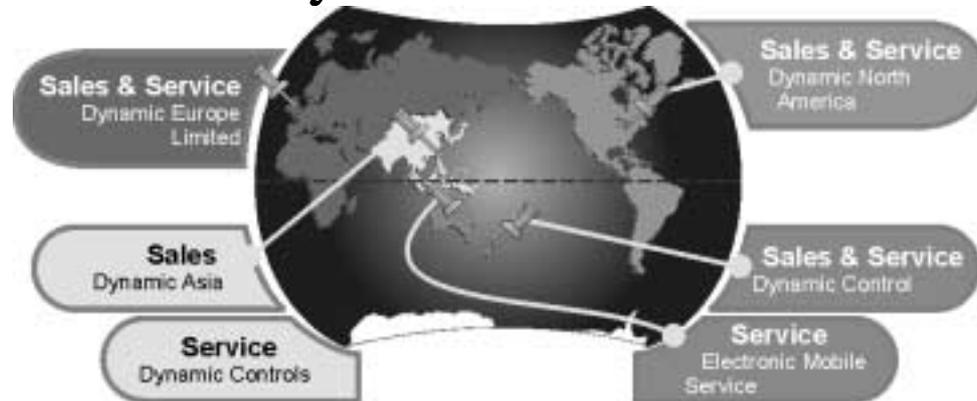
The Warranty is subject to the provisions that the equipment:

- 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 other than personnel authorised by Dynamic Controls.
- Has been used solely for the driving of electrically powered wheelchairs in accordance with the wheelchair manufacturer's recommendations.

## 8 SALES AND SERVICE INFORMATION

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

[www.dynamic-controls.co.nz](http://www.dynamic-controls.co.nz)



### New Zealand – Head Office

#### Dynamic Controls

17 Print Place  
PO Box 1866  
Christchurch  
New Zealand  
E-mail: [info@dynamic-controls.co.nz](mailto:info@dynamic-controls.co.nz)

Ph: +64 3 962 2519  
Fax: +64 3 962 2966

### Australia – Service Agent

#### Electronic Mobile Service

46 Berripa Close  
North Ryde  
Sydney, NSW  
Australia 2113  
E-mail: [fredems@ozemail.com.au](mailto:fredems@ozemail.com.au)

Ph: +61 2 9887 2824  
Fax: +61 2 9887 2114

### Europe – Sales & Service

#### Dynamic Europe Ltd.

Stonebridge Cross Business Park  
Droitwich, Worcester  
WR9 0LW  
United Kingdom

E-mail: [sales@dynamic.eu.com](mailto:sales@dynamic.eu.com)

Ph: +44 1905 772 321  
Fax: +44 1905 827 520

### Asia – Sales

#### Dynamic Controls Ltd. Asia

Floor 4-3, No. 59  
Tien Hsiang Rd  
Chung Shan District  
Taipei 104  
Taiwan R.O.C.  
E-mail: [sgoh@dynamic-controls.co.nz](mailto:sgoh@dynamic-controls.co.nz)

Ph: +886 955 335 243  
Fax: +886 943 837 402

### North America – Sales & Service

#### Dynamic North America

31335 Industrial Pkwy  
Suite 2  
North Olmsted, OH 44070  
USA  
E-mail: [sales@dynamic-controls.com](mailto:sales@dynamic-controls.com)

Ph: +1 440 979 0657  
Fax: +1 440 979 1028

**Note :** The controller should be clearly labelled with the manufacturer's service agent's telephone number.