



Modular powerchair control system

dynamic™ 

DX/DX2 PRODUCT SELECTION GUIDE

1 Introduction to the DX System

The DX System is a modular powerchair control system. This modularity makes it possible to design a powerchair that can meet the requirements of any user - requirements that can range from simple drive-only control to full environmental control. Just add additional modules when requirements grow.

The heart of the DX System

The most basic DX control system consists of two parts:



A DX Power Module, connects to the battery and to the motors



A DX Master Remote

The Master Remote is the brain of the DX System. Every DX System must have one, and only one. There are several different Master Remotes available to choose from: with joystick, without joystick, chin remote, attendant remote, etc.

DX System extensions

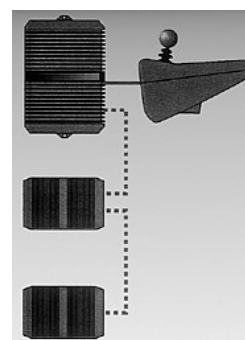
In addition to the Power Module and the Master Remote, many other remotes and modules are available to extend the DX System, like:

- Secondary Remotes, for example: attendant remotes, sip 'n puff, finger steering
- Switch input modules
- Lighting and Seating control modules
- Environmental control modules

The DX System can be extended to a maximum of 16 modules.

DX System connections

All modules are connected to each other by a DX BUS cable. Most DX Modules have two DX BUS connector sockets. That way you can connect another DX part easily.










DX BUS is an interface (the way the modules "talk" to each other) based on the CAN interface, which is widely used in the automotive industry. CAN is well known for its reliability and its fault detection. DX BUS inherits this reliability, and even improves on it.

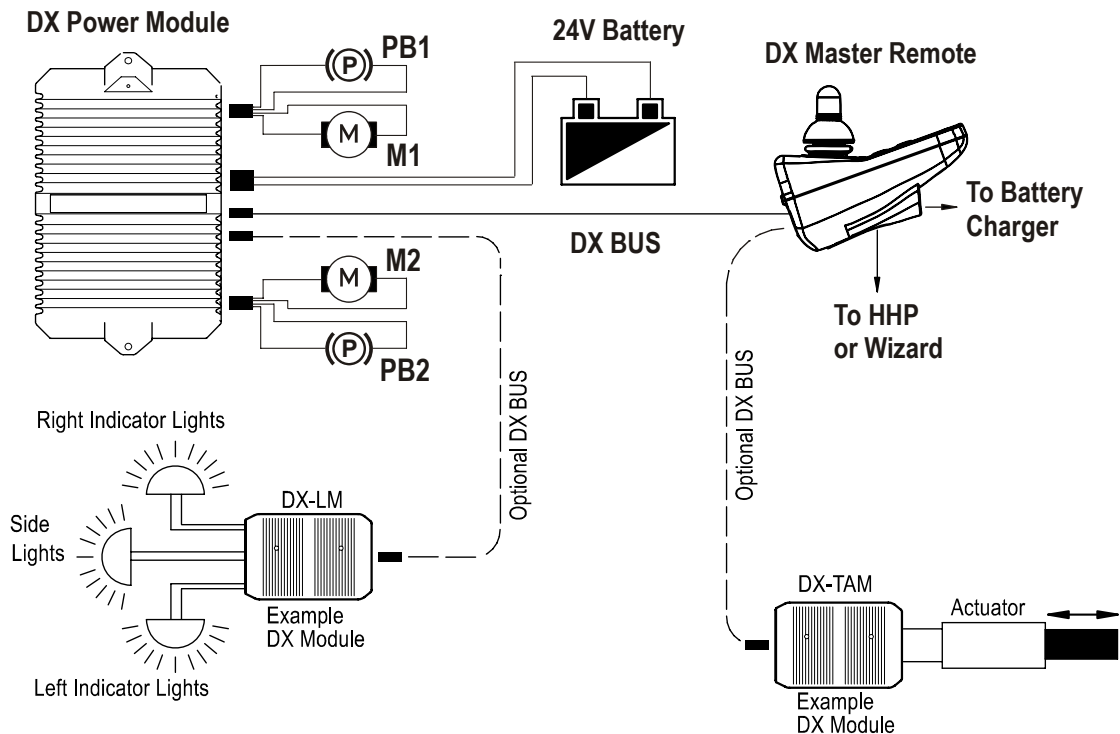
One system fits all

Start out with a simple system and add the modules you need at the time they become available, or when the application requirements grow.

2 A typical DX powerchair setup

A standard powerchair installation with the DX System consists of the following electrical parts:

	The Batteries
	The Motors
	The Parkbrakes
	A DX or DX2 Power Module
	A DX or DX2 Master Remote
	The DX BUS cables
	Optional: Actuator or Environmental Control Modules

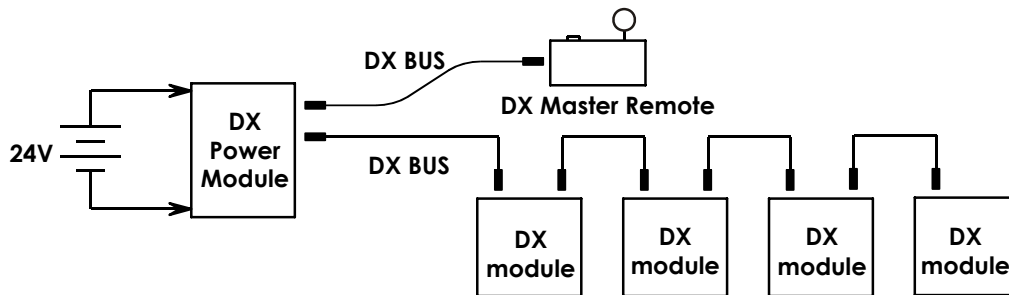


Do not install, maintain, or operate this equipment before you have read and understood the installation manuals for the DX System and DX Modules as fitted. Follow the instructions of the manuals, otherwise injury or damage can result.

2.1 DX BUS Module connection layout

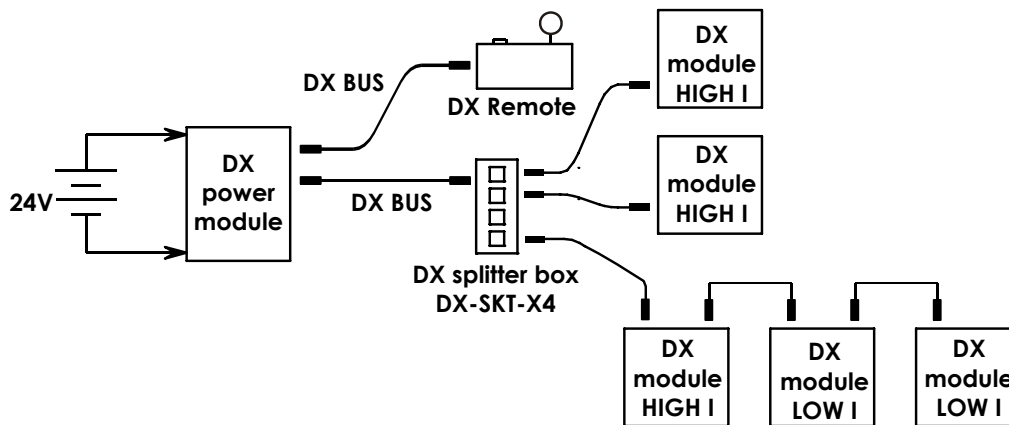
DX Modules normally have one or two DX BUS sockets for system interconnections. Smaller DX Modules can have a fixed cable that ends in a DX BUS plug, instead of DX sockets.

The optimum connection layout is dependent on the type of modules that are present in the DX System. Low-current modules can be connected in series. This provides a low-cost and simple solution.




DX modules connected in series

Because of the internal resistance of the DX BUS cable, high-current modules can cause a voltage drop on the DX BUS when they are connected far away from the Power Module. For this reason all high-current DX Modules (for example actuators and lights) must be connected as close to the Power Module as possible, preferably in parallel.



High-current DX modules connected in parallel

 **Note:**
The total length of all DX BUS cables together must not exceed 15 m.

3 The DX/DX2 Power Module

The Power Module converts the speed and direction signals generated by a DX Remote into high current outputs. These outputs drive the motors and activate the parkbrakes.

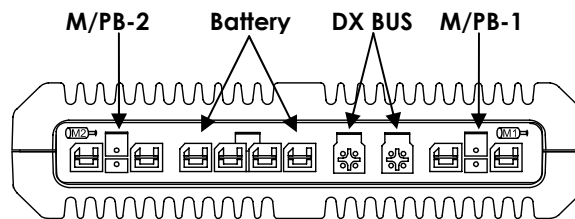
The Power Module must be connected to:

- The DX BUS
- The battery
- The motors
- The parkbrakes

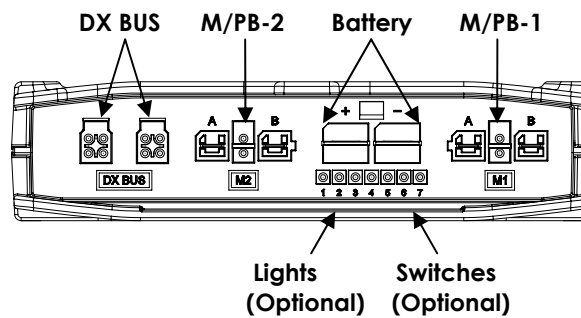
DX2 Power Modules can also optionally connect to

- Lighting
- Input speed pot
- Input switches (for park brake release or slow down functionality)
- On Board Charger

DX Power Module










DX2 Power Module



The Power Module is programmable for a wide range of powerchair types and user needs.

3.1 Available Power Modules

Power Module	Current
 DX-PMB	60A dual
 DX2-PMA70	70A dual
 DX2-PMA70L	70A dual + lighting control
 DX-PMB2	80A dual
 DX2-PMA90	90A Dual (120A boost)
 DX2-PMA90L	90A Dual (120A boost) + lighting control
 DX-PMB2-S	160A single (2x 80A parallel)

All Power Modules are suitable for 24V DC motors.

The PMB2-S has its two motor and Park Brake channels driven in parallel, for a single motor output with twice the current of each channel of a standard Power Module. The PMB2-S is used in DX Systems with only one drive motor, such as servo steered powerchair systems.

4 The DX Master Remote

4.1 Introduction

The Master Remote is the central building block in a DX System. Every DX System must have one, and only one Master Remote.

The DX Master Remote

- Acts as the primary user interface
 - Has the system on/off switch
 - Reads user commands (joystick movement, button pushes, switches)
 - Displays the system status to the user via the System Status LED
- Controls the status of the DX System
- Stores and controls up to six Drive Profiles.
- Provides a DX System programming socket for the HHP or the Wizard.

The Master Remote is fully programmable to suit a wide range of powerchair types and user needs. Correct installation and programming are essential to ensure optimum performance and safety.

Examples of Master Remotes



DX2-REM550



DX-REMG90











DX-REMG91

Most Master Remotes have their own user input device in the form of a joystick, but this is not always the case. For example: the G91 does not have a joystick, it depends on either a Secondary Remote or a set of switches to obtain direction and speed commands.

Most Master Remotes have their own display with battery gauge and system status information. Some Master Remotes however, such as the chin remote and the tray remote, do not have their own display, they only have a System Status LED.

4.2 Available Master Remotes

4.2.1 Master Remotes

Master Remote	Features
 <p>DX2-REM550 DX2-REM551</p>	<p>Low force joystick Switched control available Joystick only menu control available Advanced seating control (16 functions available) Infra-red mouse control + environmental control DX2 System Backup Mirror: swap remotes without programming REM550: 7 buttons REM551: 5 buttons (no indicator buttons)</p>
 <p>DX-REMG90A DX-REMG90T</p>	<p>Switched and 3Q RIM control available Joystick only menu control available Seating and lighting Environmental control G90A: two sockets to connect external switches G90T : two toggle switches</p>
 <p>DX-REM34B</p>	<p>Seating and lighting All actuators directly accessible from keypad</p>
 <p>DX-REM41D</p>	<p>Tray remote Seating and lighting All actuators directly accessible from keypad</p>
 <p>DX-REM32B Chin Remote</p>	<p>Chin control Drive only: Joystick, on/off switch, Speedpot No display No battery charger socket, only a programming socket</p>
 <p>DX-REM35B Tray Remote</p>	<p>Drive only: Joystick, on/off switch, Speedpot No display No battery charger socket, only a programming socket</p>
 <p>DX-ACU3B Attendant Control Unit</p>	<p>Master Remote joystick for attendant use. Switch to take control / release control Can control chair, charging and actuators. Optionally use Secondary Remote for user control.</p>
 <p>DX-REMG91 DX-REMG91S</p>	<p>3-quadrant RIM, switched or proportional Optional joystick control with Secondary Remote Can be mounted close to the face of the user to optimise visibility Seating (incl. bi-directional), lighting and environmental control Accessory Shortcut Key gives access to the last used function G91S: provides single switch scanning in addition</p>

5 DX Modules

5.1 Introduction

Including the Power Module and the Master Remote, a DX System can contain up to 16 DX compatible modules depending on the application.

Available types of DX Modules are

- Remote Joystick Module (RJM),
 - DX-RJM Secondary Remotes
 - Switch modules
- Attendant Control Unit (ACU), joystick with attendant switch and Speed Pot
 - DX-ACU1
- Actuator Modules
 - DX2-ACT2/4, DX-CLAMB
- Actuator Remote Control (ARC), 5 channels of extend/retract switches
 - DX-ARC / DX-ARC-SWB
- Servo Steering Motor Modules
 - DX-SLM, for steering servo motor control + lights
- Lighting Modules
 - DX-SLM/ DX-LM/ DX-CLAMB
- Environmental Control Unit Modules (ECU)
 - DX-ECU (relay module)
- Infra-red/Mouse Control Modules
 - DX-IRIS2 / DX-MTX / DX-PCMR



The DX System has the option to declare some DX Modules as safety critical. This makes sure that the DX System will not operate when that particular module is not detected during power-up.



Warning:

Each DX Module has its own Installation Manual that describes the installation requirements of that particular module. If you have purchased a specific DX Module, read and understand the installation manual of that module before installing or using the module.

5.2 Secondary Remotes

A Secondary Remote is a secondary user input device, for example an attendant joystick.








A Secondary Remote...

- Converts user input (the joystick or the switches, depending on the type of Secondary Remote) to speed and direction signals
- Sends the speed and direction signals to the Master Remote via the DX BUS
- Can control non-driving functions (for example actuators or environmental controls), if the Master Remote in use supports joystick control of these functions.







To use a Secondary Remote, select it as the **Joystick Source** in one of the Drive Profiles.

Only one RJM-type Secondary Remote can be present in a DX System at the same time.





5.2.1 Available Secondary Remotes

Secondary Remote	Description / Applications
 DX-RJM	Remote Joystick Module Attendant joystick User joystick for Master Remotes without joystick User joystick mountable on the armrest or away from it Compact chin remote
 DX-RJM-HD	Heavy Duty Joystick Users without finer hand movement Situations where a normal joystick can be damaged
 DX-RJM-MINI	DX Mini Joystick Full proportional control with very little movement or force Completely sealed - can be used as a tongue joystick
 DX-ACU1	Dual Control Attendant joystick Attendant can take drive control with Attendant/User switch Attendant can adjust chair speed ACU-type Secondary Remote - can be used together with an RJM-type Secondary Remote
 DX-RJM-VIC-CCD	Finger Steering Control Zero force optical operation Users with very little strength in their hand/fingers Full proportional control Finger movement of 2 mm per direction is enough
 DX-ACC4B (RJM-type)	Four Switch Interface 4 Driving switch inputs (provides up to eight driving directions) 1 Mode switch input (Drive Profile + Actuator selection)
 DX-SNP (RJM-type)	Sip and Puff Module Recognises soft and hard sips and puffs Sip and puff pressures programmable Analog Latch mode gives infinitely adjustable cruise speed 3 momentary modes, 4 latched modes


5.3 DX Steering/Actuator/Lighting Modules

DX Module	Function / Applications
 <p>DX-SLM Servo Lighting Module</p>	<p>Drives a separate motor for steering castor wheels Commonly used for high speed outdoor powerchairs 24V, 30A peak, 5A continuous Servo steering 24V lighting</p>
 <p>DX2-ACT2 / DX2-ACT4 DX2 Actuator Module</p>	<p>2-Actuator and 4-actuator modules Up to 2 modules with a total of 8 actuators in a DX System Control any combination of actuators simultaneously All actuator power provided through the DX BUS Speed control for extend and retract direction separately Proportional control of actuator outputs (programmable) Individual current control of Actuator Channels Two inputs separately programmable as</p> <ul style="list-style-type: none"> • analogue speed pot or speed limit • 6-stage switch input for speed limit and trip functions
 <p>DX-CLAMB Combined Lighting and Actuator Module</p>	<p>Compact module to connect all common functions:</p> <ul style="list-style-type: none"> • Five actuators • Front lights, Rear lights • Left and right turning indicators, Hazard lights <p>All power and control signals provided through the DX BUS Soft Start feature provides smooth actuator control Slow/Stop input (for actuator position switches)</p>
 <p>DX-LM-Z Lighting Module</p>	<p>24V lighting (DX-LM-Z)</p> <ul style="list-style-type: none"> • Front lights, Rear lights • Left and right turning indicators, Hazard lights <p>Short-circuit and open-circuit detection</p>
 <p>DX-ARC5 Actuator Remote Control</p>	<p>Separate handset for actuator control Ideal for</p> <ul style="list-style-type: none"> • attendant use • users who have difficulty with the controls of the Master Remote <p>Controls up to 5 seat positioning actuators Actuators can optionally be operated while driving Can be programmed to control horn, lights and driving Needs DX2-ACT2/4 or DX-CLAMB to operate</p>
 <p>DX-ARC-SWB ARC Switchbox</p>	<p>Controls up to 5 seat positioning actuators Can be programmed to control horn, lights and driving Operates with external switches (DB15 connector) Choose switch combinations and mounting positions freely One extra 24V/1A power supply output</p>

5.4 DX Environmental Control Modules

DX Module	Function / Applications
 <p>DX-ECU Environmental Control Unit</p>	<p>Needs the DX2-REM55x, the G90 or the G91 Remotes to operate Uses the Secondary driving Remote as input control '8 Output mode' controls up to eight separate devices 'Mouse mode' acts as a mouse mover, fifth switch acts as click Up to two DX-ECU modules in one DX System All outputs are isolated relay contacts</p>
 <p>DX-IRIS2 Infra-Red Transmitter</p>	<p>Learning infra-red remote control + mouse control 360° transmission Controls a wide range of IR appliances including GEWA devices Supported by DX2-REM55x Master Remote only Use together with a DX-PCMR for mouse control</p>
 <p>DX-MTX Infra-Red Mouse Transmitter</p>	<p>Infra-red mouse control (no environmental control) 360° transmission Supported by DX2-REM55x Master Remote only Use together with a DX-PCMR</p>
 <p>DX-PCMR Infra-Red Mouse Receiver</p>	<p>Receives mouse commands from the DX-IRIS2 or DX-MTX Works alongside the computer's existing mouse Serial port connection USB-Serial converter: DX-USB-COM</p>

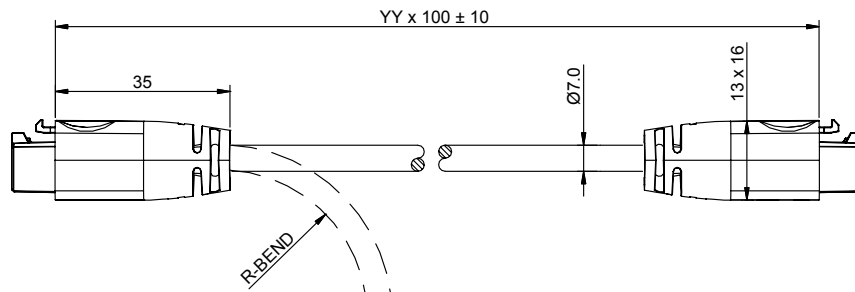
5.5 DX Auxiliary Modules

DX Module	Function / Applications
 <p>DX-ACC3 Charger Socket Module</p>	<p>Small charger socket, can be mounted in a convenient location Use with remotes that do not have a charger socket Use as an alternative to the Master Remote charger socket Maximum 8 A charging current</p>

6 The DX BUS cable

Cable specifications – straight cable

DX BUS cable straight		
Length		Part/Order number
300 mm	1 ft	GSM63003
500 mm	1' 8"	GSM63005
1.0 m	3' 3"	GSM63010
1.5 m	4' 11"	GSM63015
2.0 m	6' 7"	GSM63020
2.5 m	8' 2"	GSM63025
DX BUS extension cable (male + female plug)		
300 mm	1 ft	GSM65433
1.0 m	3' 3"	GSM63081



The part number of the straight cable is GSM630YY, where YY = the length in 100 mm.

Parameter	Value
Connector Latch Holding Force	40 N min
Cable Strain	100 N max (accidental, non-repetitive)
Cable Flex Force	10 N max
Minimum Cable Bend Radius	10 mm / 0.39 inch - fixed installation
Flexing values for (T > -10°C/14°F)	25 mm / 1 inch - occasional flexing 50 mm / 2 inch - frequent flexing
Operating Temperature (ambient, fixed installation)	-25°C to +50°C -13°F to +122°F
Cable Temperature Rating	80°C / 176°F (internal operating temp)

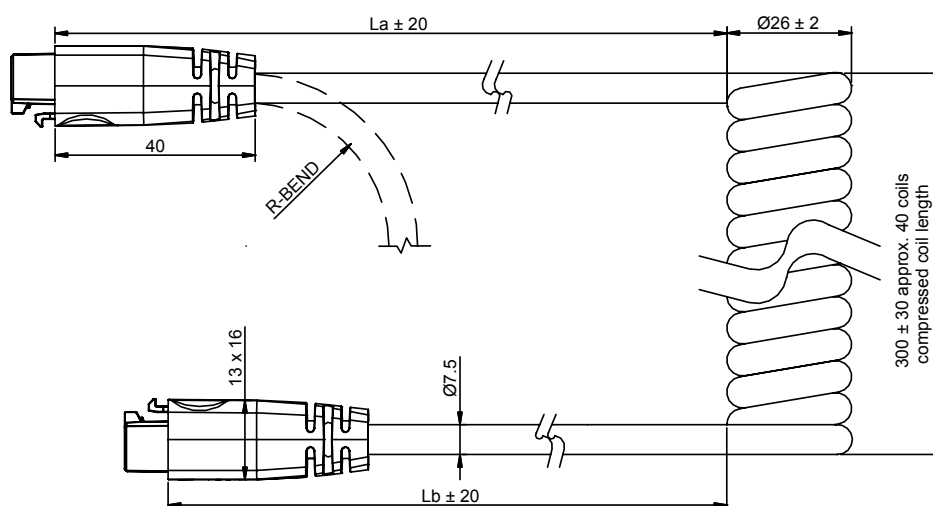


Warnings:

1. The specified bend/flex radiuses are minimum values and must be considered as a guideline only. Where frequent flexing is part of the intended application, the installer must ensure an appropriate bend/flex radius for the intended and foreseeable environmental conditions.
2. Extreme cold temperatures considerably reduce cable flexibility. Appropriate life testing must be carried out to determine/confirm the expected service life and inspection and maintenance schedule.

Cable specifications – curly cable

DX BUS Curly Cable			
Tail Length La	Coil Length	Tail Length Lb	Part/Order number
200 mm / 8 inch	300 mm / 1 ft	200 mm / 8 inch	GSM63051
500 mm / 1'8"	300 mm / 1 ft	200 mm / 8 inch	GSM63052



Parameter	Value
Connector Latch Holding Force	40 N min
Cable Strain	100 N max (accidental, non-repetitive)
Spring Force - extension refers to the coiled section	< 20N @ 2x extension (T > 10°C/50°F) < 50N @ 2x extension (T > -10°C/14°F) < 30N @ 3x extension (T > 10°C/50°F)
Minimum Cable Bend Radius	20 mm / 0.8 inch - fixed installation
Flexing values for (T > -10°C/14°F)	30 mm / 1.2 inch - occasional flexing 50 mm / 2 inch - frequent flexing
Operating Temperature (ambient, fixed installation)	-25°C to +50°C -13°F to +122°F
Cable Temperature Rating	80°C / 176°F (internal operating temp)



Warnings:

- Do not extend the coils when the temperature is below 0°C/32°F. Do not extend the coils farther than 2x compressed length when the temperature is below 10°C/50°F. Avoid extension above 3x compressed length at all times. This may result in permanent stretching of the coils.
- Make sure that the spring force is not applied to the DX BUS connector. Fasten a strain relief or cable tie on or near to the coiled section of the cable.

EUROPE

Ph: +44-1562-826-600

Fax: +44-1562-824-694

eusales@dynamiccontrols.com

ASIA

Ph: +886-955-335-243

Fax: +886 225-981-562

asiasales@dynamiccontrols.com

AUSTRALASIA (CORPORATE OFFICE)

Ph: +64-3-962-2519

Fax: +64-3-962-2966

sales@dynamiccontrols.com

USA

Ph: +1-440-979-0657

Fax: +1-440-979-1028

usasales@dynamiccontrols.com



Dynamic Controls is the world's leading manufacturer of electronic controls for power wheelchairs and scooters.
DYNAMIC was established in 1972 and is headquartered in New Zealand.
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ISO 13485 certified –

DYNAMIC goes above and beyond industry standard expectations to ensure customers receive the best products possible.