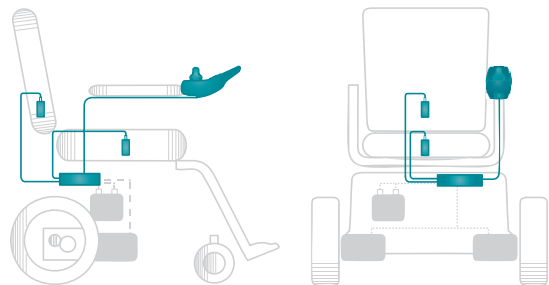




ACS2 REMA / B Remote

dx²™
THE
ULTIMATE
POWERCHAIR
CONTROL
SOLUTION



dynamic™ 

DX2-REMA/B-ACS2

INSTALLATION MANUAL

About this Manual

This manual can help you understand and install the Dynamic DX2 ACS2. It describes the general principles, but it gives no guidelines for specific applications. If there is a specific requirement for your application, please contact Dynamic Controls or one of the sales and service agents to assist you.

The product is part of the DX System. This manual must be read together with the DX System Manual and all other relevant DX and DX2 component manuals.

In this manual, a few symbols will help you identify the purpose of the paragraph that follows:



Notes & Precautions:

Notes provide supporting information in order to install, configure, and use the product. Not following the instructions given in notes or precautions can lead to equipment failure.



Warnings:

Warnings provide important information that **must** be followed in order to install, configure, and use the product safely and efficiently. Not following the instructions given in a warning can potentially lead to equipment failure, damage to surrounding property, injury or death.

The term '**programming**' used in 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.

The term '**accessory**' used in this manual refers to equipment that is ancillary to the main functioning of the DX System. It does not refer to an accessory of the powerchair. The DX System is a component of the powerchair.

The DX System is not user serviceable. Specialised tools are necessary for the repair of any 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. This manual contains integration, set-up, operating environment, test and maintenance information needed in order to ensure reliable and safe use of the product.

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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1 Introduction to the DX2-REMA/B-ACS2

The DX2-REMA/B-ACS2 (ACS2) is the latest addition to the DX2 range.

The ACS2 is a fully DX-compatible simple Master Remote that offers new features, including:

- LED-based display
- Simple operation of driving, actuators and lights
- System configuration backup (with DX2 Power Modules)
- Low force joystick: typically less than 2.2 N
- Symmetrical button position for both left and right hand mounting
- Serial number is visible when mounted
- Full range of audible feedback options, including reversing beeper

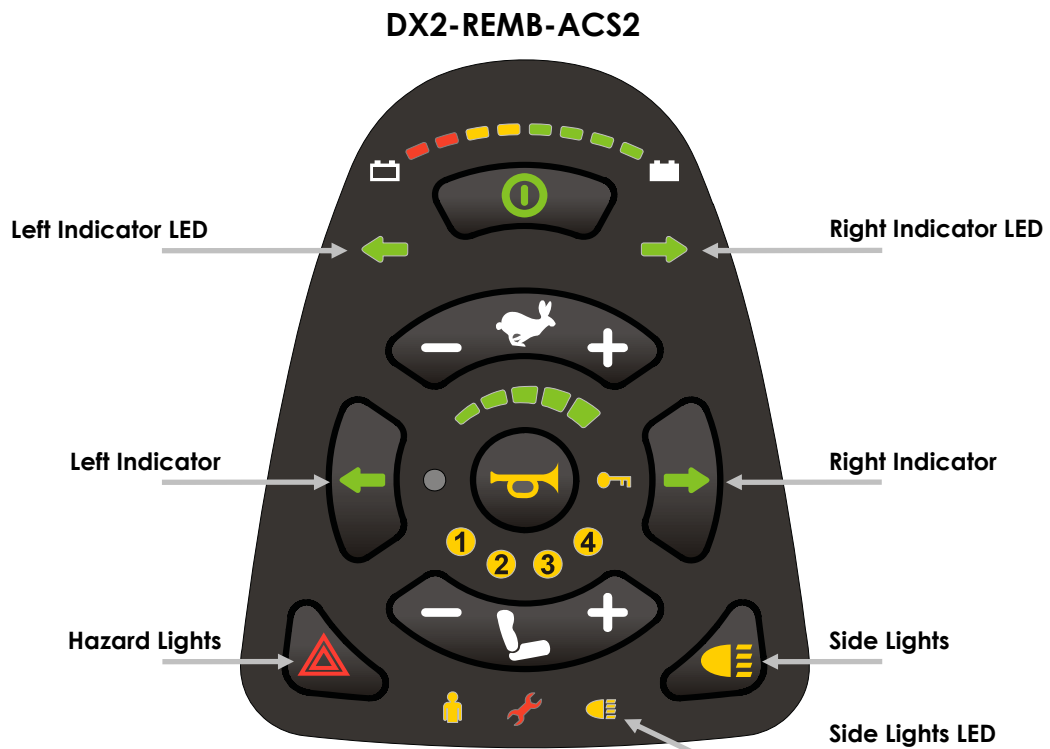
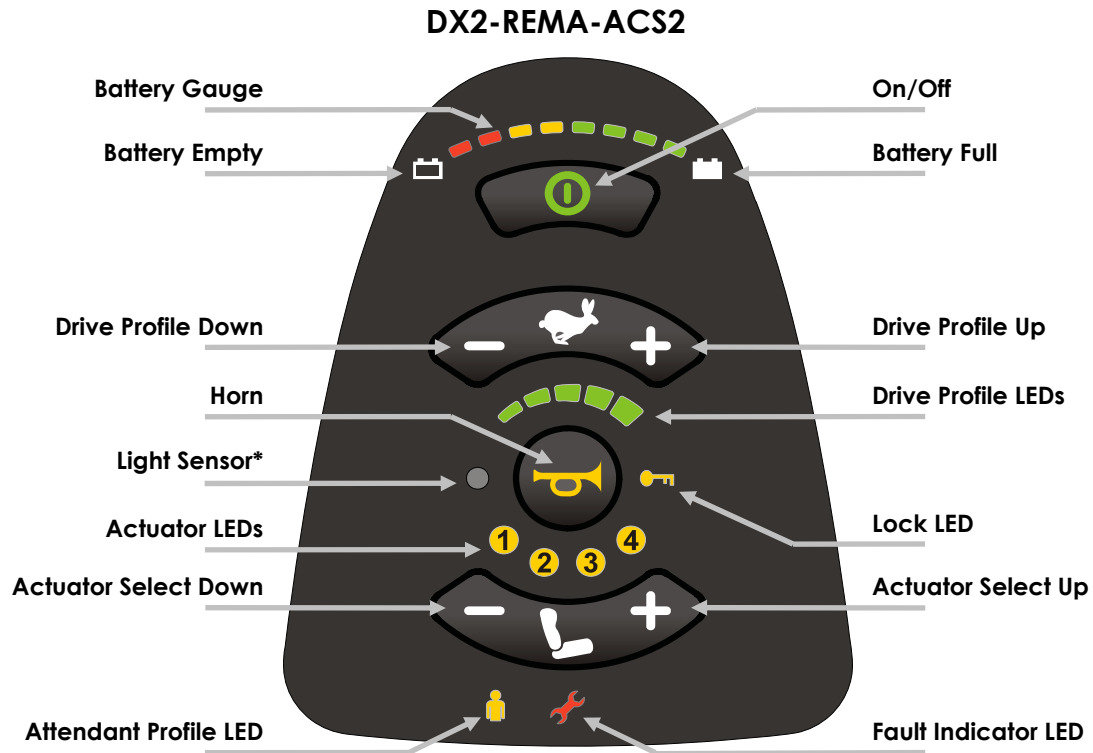
**Notes:**

The ACS2 is part of the DX System. Read the DX System manual before reading this manual.

*In this manual, the DX System manual is referred to as **DSM**.*

2 ACS2 Operation


2.1 The Keypad

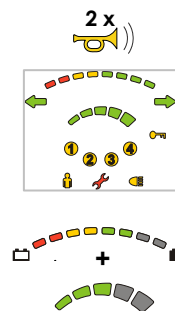


*The light sensor dims the display when it is dark


2.2 Turning the DX System on and off

To turn on the DX System

	<p>Press the on/off button.</p> <ul style="list-style-type: none"> The DX System starts up. The ACS will beep twice* and all LEDs on the keypad turn on simultaneously**. <p>After the system has started up successfully, the Battery Gauge shows the charge of the battery and the Drive Profile LEDs show the currently selected Drive Profile.</p>
---	--



To turn off the DX System

	<p>Press the on/off button.</p> <ul style="list-style-type: none"> The DX System turns off. <p>If the on/off button is pressed while the chair is driving, the chair will perform an emergency stop before it turns off.</p>
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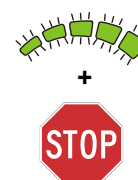
*If **Mode Change Beep** (see 4.1.1.6) is set to 'Yes'

If **LED Test Pattern (see 4.1.1.3) is set to 'Yes'

The system starts up in Drive Mode with the Drive Profile that has been set with **Power-Up Profile Number** (see 4.1.1.1).

2.2.1 Out Of Neutral At Power Up (OONAPU)

 	<p>If the ACS2 is turned on while the joystick is not in the centre position, an "Out Of Neutral At Power Up" fault occurs.</p> <p>During an OONAPU fault the five Drive Profile LEDs flash continuously and the chair will not drive.</p> <p>As soon as the joystick is released back to the centre, the fault goes away and the chair will drive normally. If the joystick is not released back to the centre within 4 seconds, the OONAPU fault becomes a Module Fault (Flash Code 1)*. To clear this fault, turn the DX System off and then turn it back on.</p>
--	--



*If **Disable OONAPU Faults** (see DSM 5.3.9.4) is set to 'No'

OONAPU is a feature that prevents sudden and unexpected powerchair movements if the joystick is out of the centre when the controller is turned on.



Warning:

If an OONAPU error does not go away after the joystick is released, the ACS2 may be damaged. Do not use the powerchair and contact a service agent.

2.2.2 System Lock



If the **Lock Enable** parameter (see DSM section 5.3.9.7) is set to 'Yes', the system can be locked by pressing the on/off button for more than 4 seconds. Lock the DX System to prevent unauthorized persons from operating the chair.

To lock the DX System

	<p>Press the on/off button for 4 seconds when the DX System is turned on.</p> <ul style="list-style-type: none"> The DX System turns off immediately when the on/off button is pushed. After 4 seconds all Drive Profile LEDs and the Lock LED turn on for 1 second to indicate that the DX System is now locked.
--	---

To unlock the DX System

	<p>Press the on/off button.</p> <ul style="list-style-type: none"> The Lock LED will flash for 10 seconds to indicate that the DX System is locked.
	<p>Press the horn button twice within 10 seconds.</p> <ul style="list-style-type: none"> The DX System will turn on normally. <p>If the horn button is not pressed within 10 seconds, the DX System will turn off again.</p> <p style="text-align: right;">< 10 s → on</p> <p style="text-align: right;">> 10 s → off</p>

2.2.3 Sleep mode



If the **Sleep Mode Enable** parameter (see DSM 5.3.9.8) is set to 'Yes', the DX System will go to sleep after a period of inactivity. This period can be set with the **Sleep Timeout** parameter (see DSM 5.3.8.5).



When the DX System sleeps, it is partially turned off to reduce energy consumption and to make sure that the powerchair does not move when the user accidentally moves the joystick.

To wake up the DX System

	<p>Press any button on the ACS2.</p>
	<p>If the Enable Joystick Wakeup parameter (see DSM 5.3.9.10) is set to 'Yes', press any button or move the joystick.</p> <ul style="list-style-type: none"> The DX System turns on.

2.3 Driving

2.3.1 The Joystick



	<p>Move the joystick.</p> <ul style="list-style-type: none"> The powerchair starts to drive in the direction of the joystick movement. The amount of joystick movement determines the speed of the powerchair. If the joystick is moved further from the centre, the powerchair will drive faster. 
---	--

2.3.2 The Drive Profile










The ACS2 supports 5 Drive Profiles (see DSM 5.3.2). A Drive Profile is a specific drive setting (slow or fast, indoors or outdoors) that your therapist or dealer can adjust to suit your personal needs and preference. You can select the active Drive Profile with the Drive Profile Selection button.

To select the Drive Profile



	Press '+' to increase the Drive Profile.
	Press '-' to decrease the Drive Profile.

Select a Drive Profile that matches your preference and environment. The currently selected Drive Profile is shown on the Drive Profile LEDs.

LEDs	Meaning
	Drive Profile 0*. The powerchair does not drive.
	Drive Profile 1.
	Drive Profile 2.
	Drive Profile 3.
	Drive Profile 4.
	Drive Profile 5.
	Attendant Drive Profile (Drive Profile 6). See also Attendant Mode (2.9).

*If **Allow non-driving Profile** (see DSM 5.3.8) is set to 'Yes'. In Drive Profile 0 the user can leave the chair on while unintended joystick movements do not cause the chair to move.

2.4 The Horn

	<p>Press the horn button.</p> <ul style="list-style-type: none"> The horn will sound as long as the button is pressed. 
---	---

2.5 The Seating Functions



In the Seating Mode the joystick does not drive the chair, it selects and operates the seating functions instead.

Activate the Seating Mode



Press the '+' or the '-' on the Actuator Selection button to activate Seating Mode.

- The Seating Mode starts with the seating function that was last selected.

The Actuator LEDs indicate the currently selected seating function.



Select the seating function



Press '+' or move the joystick right to select the next seating function.



Press '-' or move the joystick left to select the previous seating function.



Operate the seating function



Move the joystick forward to operate the seating function in one direction.



Move the joystick in reverse to operate the seating function in the opposite direction.

- The active actuator LED flashes while the seating function is operated.



If you move the joystick further forward, the seating function moves faster*.

Return to the Driving Mode



Press the '+' or the '-' on the Drive Profile Selection button to return to the Driving Mode.

- The Driving Mode returns to the Drive Profile that was selected before the Seating Mode was activated.

*If the DX2-ACT parameter **Operating Mode** is set to 'X Proportional' or 'Y Proportional'








Note:

The orientation of the joystick depends on the value of the **Axis Swap in Actuator Mode** (4.1.1.4), **Rotate Joystick 90°** (4.1.2.4), **Joystick Swap Forward / Reverse** (4.1.2.2), and **Joystick Swap Left / Right** (4.1.2.3) parameters. The description of the menus in this manual assumes that all these parameters have the value 'No' or 'Normal'.


All joystick navigation and operation requires deflection past the **Joystick Switch Threshold** parameter value, except in proportional mode.

2.5.1 Available seating functions

The ACS2 can operate 4 seating functions.

Actuator Function LEDs	Meaning
	Seating Function 1 selected
	Seating Function 2 selected
	Seating Function 3 selected
	Seating Function 3 and 4 selected*
	Seating Function 4 selected

Only actuators that have been enabled and detected are shown.



***Note:**

If The ACS2 is used with a **CLAM** or a **TAM**, this selection operates actuator 3 and 4 simultaneously. This selection is only available if the **Actuator 3 Enable** and the **Actuator 4 Enable** and the **Actuator 3+4 Enable** parameters have the value 'Yes'.

If the ACS2 is used with a **DX2 Actuator Module**, this selection operates Seating **Function number 9** (two leg rests), it does not operate Seating Function Number 3 or 4.



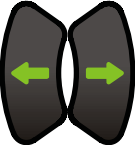
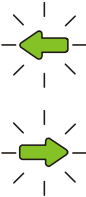

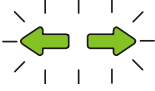
If you use a DX2 Actuator Module with the ACS2, make sure to program 3 different Actuator Profiles with

- F3 to control the left leg rest
- F4 to control the right leg rest
- F9 to control both leg rests simultaneously


If F9 is not programmed in a DX2-ACT module, the F3+F4 selection is not available.

2.6 The Lights (REMB only)

To operate the lights

	<p>Press the side light button to switch the side/positioning lights on or off.</p> <ul style="list-style-type: none">The side light LED is on when the side lights are switched on.	
	<p>Press the indicator buttons to switch the indicators on or off.</p> <ul style="list-style-type: none">The indicator LEDs flash at the same rate as the indicator lights. <p>The indicators will switch off automatically *.</p>	
	<p>Press the hazard light button to switch the hazard lights on or off.</p> <ul style="list-style-type: none">Both indicator LEDs flash together at the same rate as the indicator lights.	

* If the **Indicator Auto-cancel** parameter (see 4.1.1.2) does not have the value 'Off'.

	<p>Notes:</p> <ol style="list-style-type: none">It is only possible to operate lights that have been enabled and detected.Lighting faults cause a Flash Code 2 on the Fault Indicator LED. For more information, see section 2.8.
---	---

2.7 The Battery Gauge

2.7.1 Battery charge indication

The Battery Gauge indicates how much battery charge remains.

Battery Gauge	Meaning
	Warning: battery too full. Slow down if you are driving down a slope.
	Battery full.
	Battery half full. Start the return journey.
	Battery low. Recharge soon.
	Battery almost empty. Recharge now.
	Warning: battery empty. Recharge immediately.

The remaining battery capacity does not translate directly to remaining physical range of the powerchair. The remaining physical range depends on the ambient temperature, the capacity and age and state of the battery, the driving style of the operator and the terrain that the powerchair is being used in. Most of these factors can vary between, or within, one journey.

Note:

If you drive your powerchair until the battery is completely empty or leave the battery with a low charge for a long time, you will damage the battery. This damage is permanent. The battery will never return to its original capacity and your chair will have a shorter range.

2.7.2 Other indications

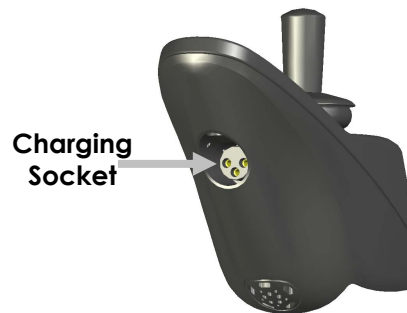
Apart from the remaining battery charge, the Battery Gauge also indicates the following conditions.

Battery Gauge	Meaning
	Drive Inhibit, the chair will not drive. The LEDs turn on one by one from left to right.
	A charger is connected to the ACS2. The LEDs turn on one by one from left to right, followed by one second where the current battery capacity is displayed. This repeats while the charger is connected.
	A fault has occurred. All LEDs turn on one by one from left to right to indicate that the chair will not drive. The Fault Indicator LED will show the corresponding Flash Code (see DSM section 9.6).

2.7.3 Battery Charging

The 3-pin XLR battery charging socket is located on the front of the ACS2.

The powerchair does not drive when the batteries are being charged. Make sure that the battery charger you use provides a drive inhibit signal before you connect it to the charging socket. If you are not sure, ask your dealer.



When the Battery Charger shows a 'full' battery charge, you can remove the charger connector from the ACS2.



Notes:

1. It is recommended to leave the DX System off while charging. A load during charging (such as moving the actuators) causes a temporary voltage drop in the battery. The voltage drop causes some battery chargers to think that the battery is still empty while it is actually fully charged. Depending on the specifications of the battery charger, this can result in overcharging and possible battery damage. Read the manual of your battery charger for more information.
2. Overcharging dramatically decreases the lifespan of a battery.
3. If the DX System is turned off or goes into sleep mode while charging, charging will continue.



Warnings:

1. Do not disconnect the batteries or open the circuit breaker during charging. See the manual of the battery charger for more information.
2. To remove the charger cable, pull on the plug. Do not pull on the cable. Remove the plug in the direction of the cable, do not try to turn the plug.
3. Select and adjust the battery charger according to the instructions of the battery manufacturer. Failure to do so can damage or destroy the batteries, give poor driving range, or be potentially dangerous.

Drive Inhibit configuration



The Drive Inhibit signal makes sure that the powerchair does not drive when the batteries are being charged. This signal must be provided within the battery charger connector as a connection between pin 2 and pin 3.

2.8 The Fault Indicator LED



The Fault Indicator LED turns on when the chair needs maintenance or when a fault has occurred.

2.8.1 'Service due' indication

If the powerchair has exceeded the drive time of the maintenance schedule, the Fault Indicator LED turns on continuously for 15 seconds every time the system is turned on.



15 s
Service due

Please take the chair to a qualified service technician for maintenance.

The service technician can reset the Service Due time with the Service Scheduler. See the DX2 Power Module installation manual for more information about the Service Scheduler.



Note:

The 'service due' indication only works when a DX2 Power Module is installed. If a DX Power Module is used, the 'service due' indication is disabled.

2.8.2 Fault indication

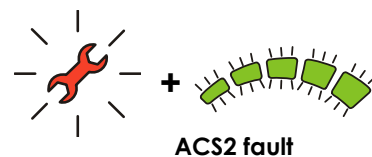
If a system fault condition exists, the Fault Indicator LED shows a Flash Code. A flash code is a specific number of short flashes, followed by a pause.



Flash Code

The Fault Indicator LED flashes the same number of times as the flash code number. For a description of the flash codes, see [Flash Codes](#) (section 2.8.3).

If the fault is located within the ACS2 itself (and not in another DX Module), all five Drive Profile LEDs flash at the same time as the Fault Indicator LED.



If the fault is a serious fault that prevents the chair from driving, additionally the Battery Gauge shows a 'Drive inhibit' indication (see 2.7.2).



2.8.3 Flash Codes

If a system fault condition exists, the Fault Indicator LED shows a Flash Code.
A flash code is a specific number of short flashes, followed by a pause.

Flash Code	Fault source	Meaning
1	DX Module	<p>The internal communication of the DX System has been lost.</p> <ul style="list-style-type: none"> • Turn off the DX System, and then turn it on again. <p>The DX BUS connection of a DX Module is faulty.</p> <ul style="list-style-type: none"> • Check the DX BUS cables and the DX BUS connections, and then turn the DX System off and on. <p>If the Status LED on another Module is flashing too, there may be an internal fault in that Module.</p> <ul style="list-style-type: none"> • Contact your dealer.
2	DX Accessory	<p>A DX Module with a Slow/Stop input (for example a seating module) is set to slow or stop. This may not be a fault, it is probably caused by the seat position being extended. In this case, Flash Code 2 indicates that the chair may go slower than expected.</p> <ul style="list-style-type: none"> • Move the seat back to the neutral position. <p>There is a fault in an accessory device attached to a DX Module. For example: a light bulb is defective, a clutch is disengaged, or an actuator terminal is shorted to Battery '+'. <ul style="list-style-type: none"> • Check all accessory devices connected to your DX System. </p>
3/4	Motors	<p>The motor is not connected to the Power Module, or there is a short-circuit in the motor connection.</p> <ul style="list-style-type: none"> • The motor brushes may have lost connection. Turn the wheels of the chair to reconnect the motor brushes, and then turn the DX System off and on. If this happens often your motors may be faulty • Check that the motor cables are not loose or damaged • Contact your dealer
5/6	Parkbrakes	<p>The parkbrake has been released manually.</p> <ul style="list-style-type: none"> • Enable the parkbrake, and then turn the DX System off and on <p>The parkbrake is not connected to the Power Module, or there is a short-circuit in the parkbrake connection.</p> <ul style="list-style-type: none"> • Check that the motor cables are not loose or damaged • Contact your dealer
7	Battery voltage too low	<p>The battery voltage is too low.</p> <p>The most probable cause of this fault is a loose battery terminal.</p> <ul style="list-style-type: none"> • Check the batteries, the battery terminals and the cables • Batteries may be empty: charge the batteries • Batteries may be damaged: contact your dealer

Flash Code	Fault source	Meaning
8	Battery Voltage too high	<p>The battery voltage is too high.</p> <ul style="list-style-type: none"> • The batteries may be overcharged • If driving downhill, slow down and turn on the lights (if fitted) <p>If this fault occurs during battery charging, the battery charger is defective or not adjusted correctly.</p> <ul style="list-style-type: none"> • Contact your dealer <p>If this fault occurs during when you stop or when you travel down a slope, and the batteries are not full, the battery connector may make intermittent contact.</p> <ul style="list-style-type: none"> • Check the battery cables and connectors.
9/10	DX BUS cable fault	<p>If the Hazard Lights were already switched on when the DX System was turned on, sometimes Flash Code 10 occurs.</p> <ul style="list-style-type: none"> • Turn off the Hazard Lights, turn off the DX System then turn the DX System on again. <p>An invalid voltage has been detected on the DX BUS. Your chair will still drive, but it drives slower.</p> <ul style="list-style-type: none"> • Check the DX BUS cables for damage. • Contact your dealer.
11	Stall Timeout	<p>The motor current has been at the maximum value for too long.</p> <ul style="list-style-type: none"> • The motors may not be strong enough for the chosen route (the route is too steep). <ul style="list-style-type: none"> ◦ Turn off the DX System, let it cool down, then turn it back on again and choose another route. • The wheels may be rubbing on the frame. <ul style="list-style-type: none"> ◦ Make sure that the wheels can turn freely. • The motors may be faulty. <ul style="list-style-type: none"> ◦ Have the motor(s) checked by a service technician.
12	Module Mismatch	<p>There is a compatibility problem between two or more DX Modules in the DX System, or a module has been programmed incorrectly. The powerchair will not drive.</p> <ul style="list-style-type: none"> • Consult your Dynamic Service Centre.



Note:

These flash code descriptions are aimed at end users.

For a more detailed flash code description see DSM section 9.6.

2.9 Attendant Mode



Attendant Mode is selected when the User/Attendant switch on the DX-ACU Attendant Control module is set to 'Attendant'.
In Attendant Mode, the Attendant Profile LED is on.

In Attendant Mode, the joystick of the ACS2 does not work. Only the joystick on the DX-ACU is operational.

All the buttons of the ACS2 still work the same as in normal mode. It is however not possible to select a different Drive Profile, because the Attendant Drive Profile (Drive Profile 6) will stay active until the attendant releases control back to the user.

If the Drive Profile selection button on the ACS2 is pushed while a seating function is selected, the ACS2 will return to Drive Mode, it will not change the Drive Profile.

See the DX-ACU Installation Manual for further details.

2.10 Operation by external DX modules

DX modules such as the DX-ARC5 or the DX-ARC-SWB can be programmed to use a pair of their buttons or switches to generate a 'DX-Profile Up' and 'DX-Profile Down' signal that is sent over the DX BUS.

The ACS2 responds to these signals as follows:

- DX-Profile Up => Drive Profile Selection button up
- DX-Profile Down => Actuator Selection button up



Pressing the applicable button or switch of the external DX Module has the same effect as pushing the buttons above.

Other devices such as the DX Mini Joystick can only generate the 'DX-Profile Up' signal, and as such only have access to the Drive Profile selection functionality.

3 Installation and testing

3.1 Specifications

3.1.1 Electrical Specifications

Parameter	Value
Operating voltage range	18V – 32V DC (nom. 24V)
Charger rating	max 12A RMS Continuous, limited by DXBUS rating
Quiescent Current	< 0.25mA Off, typically 200mA On

3.1.2 Mechanical Specifications

Parameter		Value			
Material		Injection-moulded plastic			
Protection Rating		IPx4			
Shipping Weight		650 g (excluding packing material)			
Operating Force		Joystick: Less than 2.2 N Buttons: Less than 5 N			
		Min	Nominal	Max	Units
Tube mount diameter		15 (5/8)	19 (3/4)	22 (7/8)	mm (in)
Operating Temperature Range		-25 (-13)		50 (122)	°C (°F)
Storage Temperature Range		-40 (-40)		70 (158)	°C (°F)
Operating Humidity Range		0		95	%RH

3.2 Mounting

The mounting of the DX2 ACS2 is backwards compatible with the SHARK product range. The Remote can be mounted on either side of the wheelchair to accommodate left-handed or right-handed users.

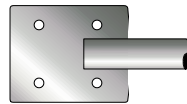
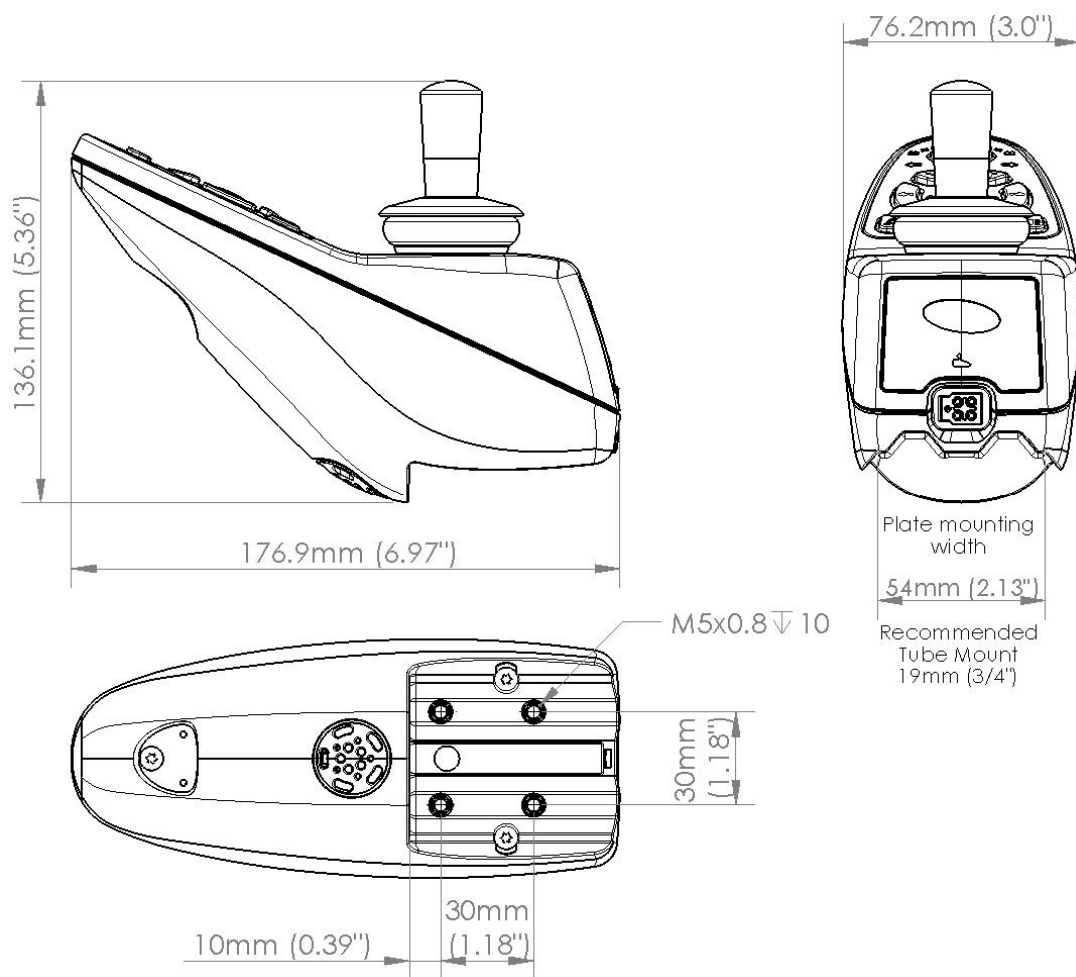


Plate Mount



Tube Mount

Mount the DX2 ACS2 on a flat plate of 54 mm (2.13") width, or on a tube with an outside diameter between 15 mm (5/8") and 22 mm (7/8"). It is possible to use either of the two mounting channels for tube mounting.



Tighten the M5 screws to a torque of approximately 3 Nm (27 lbf in).



Warnings:

- For safe installation, select a screw length that protrudes between 6 – 8 mm into the case. Do not over-tighten.
- The ACS2 is not waterproof. Make sure to protect the ACS2 from water entry if necessary.

3.3 ACS2 connection with the DX System

The DX BUS connector socket is located at the back of the ACS2.



Warning:

The ACS2 does not have a cover that protects the DX connector. Make sure that the connector is appropriately positioned on the chair to protect it from damage.

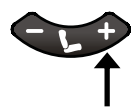
3.4 System Backup Mirror

The DX2 Power Module and the ACS2 both have a backup copy of all the system programmable parameters. If either the ACS2 or the DX2 Power Module is replaced, the ACS2 detects that its parameters are different from those in the Power Module and asks the user to choose which module has the correct settings. **Choose the module that has not been replaced.**

To indicate that the parameter values in the Power Module and the ACS2 are not the same, the ACS2 flashes actuator LEDs 1 and 4 simultaneously.



Select the ACS2 as the source

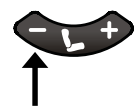


Press the '+' on the Actuator Selection button to select the ACS2 as the source. The settings of the Remote will be copied into the Power Module.

- Actuator LED 4 flashes to indicate that the ACS2 has been selected.



Select the Power Module as the source

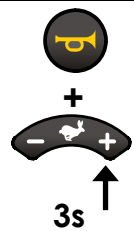


Press the '-' on the Actuator Selection button to select the DX2 Power Module as the source. The settings of the Power Module will be copied into the Remote.

- Actuator LED 1 flashes to indicate that the Power Module has been selected.



Confirm the selection



Press the Horn button and the '+' on the Drive Profile Selection button simultaneously for 3 seconds.

- The DX System will copy the settings from the chosen module into the other module. The system will then show a Flash Code 1 to indicate that it has just been programmed. Turn the power off and on to activate the new settings.

Cancel the selection



Press the Power Button to turn the system off without making any changes.

- If you later turn the system on again, both actuator LEDs will start to flash again, so you can make the selection at that time.



Note:

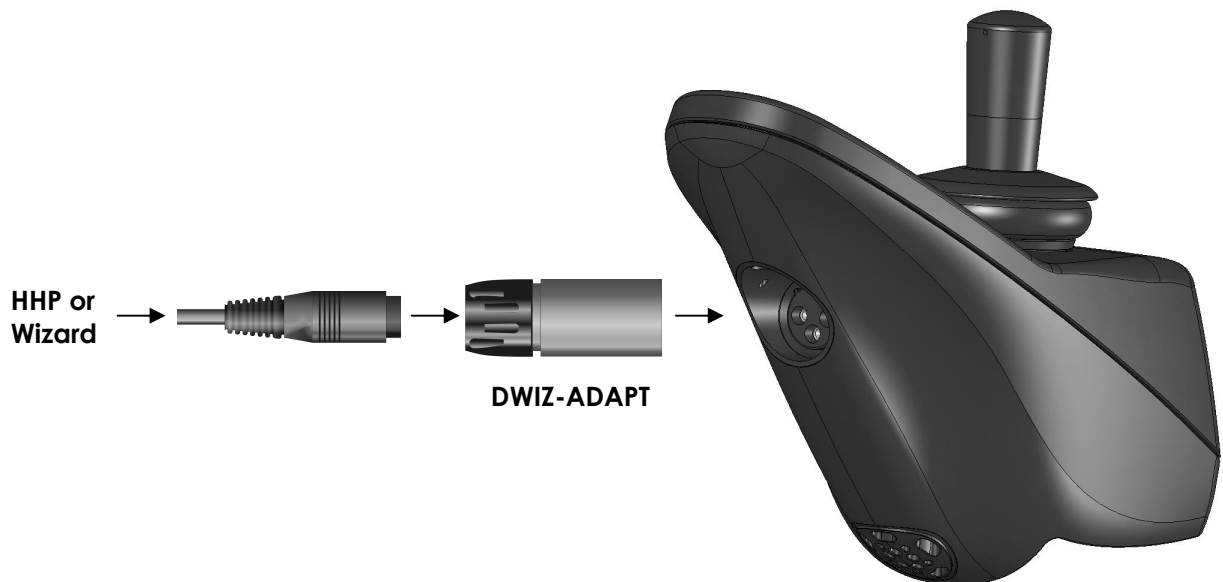
The System Backup Mirror only works if a DX2 Power Module is used. If the Power Module is a DX Module (and not a DX2 Module), the System automatically copies the program settings from the ACS2 into the Power Module. This process is called 'Auto Download'. See the DX System Manual for more information about Auto Download.

4 Programming the ACS2

**Warning:**

The DX2 ACS2 is part of the DX System. Read the DX System Manual programming chapter (DSM chapter 7) including all its warnings and notes before reading this chapter. The programming chapter of this ACS2 manual only describes ACS2-specific programming.


The XLR programming / charger socket is located at the front of the ACS2. To use this socket with the HHP or the PC-Wizard programming cable, a DWIZ-ADAPT adapter plug is needed.





The DX2 ACS2 uses UCM Rev. D software (for software revisions see DSM section 5.1.1). This revision adds several DX2 System parameters and ACS2-specific parameters.


































This chapter starts with a list of all parameters, followed by a description of all parameters that are not described in the DX System Manual.


4.1 Parameter list



























Key:  Editable at this level (see section 7.1.2.1 of the DX System manual)

 Viewable at this level






 Look in the DX System Manual for the description of this parameter

Parameter	Possible Values	Default	HHP	Lite	Std	Adv
ACS2 User Options						
Lock Enable	Yes/No	No	-			
Drive Delay at Power-Up (s)	0 - 10 s	0 s	-			
Disable OONAPU Faults	Yes/No	No	-			
Maximum Profile Number	1 – 5	5	-			
Allow non-driving profile	Yes/No	No	-			
Power-Up Profile Number	Last used Profile 1 Profile 2 Profile 3 Profile 4 Profile 5 Profile 0	Last used	-			
Wrap Profiles	Yes/No	Yes	-			
Change Profile While Driving	Yes/No	No	-			
Indicator Auto Cancel (REMB only)	Off 5 s 10 s 20 s	Off	-			
LED Test pattern	Yes/No	No				
Axis Swap In Actuator Mode	Yes/No	No				
Reversing Beeper	Yes/No	No	-			
Mode Change Beep	Yes/No	No	-			

Parameter	Possible Values	Default	HHP	Lite	Std	Adv
User Profile Options						
Joystick Switch Threshold	20 – 80 %	50 %	-	✓	✓	✓
Joystick Source	Master ACU RJM Display ARC ExtNV1 ExtNV2 None	Master	-	✓	✓	✓
Neutral Maximum	10 – 50 %	10 %	-	✓	✓	✓
Short Throw Shape	100 – 200 %	200 %	-	✓	✓	✓
Short Throw Travel	100 – 200 %	100 %	✓	✓	✓	✓
Joystick Angle Compensation	-90° to +90°	0°	✓	✓	✓	✓
Joystick Swap Forward/Reverse	Yes/No	No	-	✓	✓	✓
Joystick Swap Left/Right	Yes/No	No	-	✓	✓	✓
Rotate Joystick 90°	Yes/No	No	-	✓	✓	✓
Sleep Mode Enable	Yes/No	No	-	✓	✓	✓
Sleep Timeout	1 – 60 min	5 min	-	✓	✓	✓
Enable Joystick Wakeup	Yes/No	Yes	-	✓	✓	✓
Drive Profiles						
Forward Speed @ Maximum	10 – 100 %	N/A	✓	✓	✓	✓
Forward Speed @ Minimum	5 – 100 %	5 %	✓	✓	✓	✓
Forward Acceleration	10 – 70 %	40 %	✓	✓	✓	✓
Forward Deceleration	15 – 100 %	60 %	✓	✓	✓	✓
Reverse Speed @ Maximum	10 – 100 %	N/A	✓	✓	✓	✓
Reverse Speed @ Minimum	5 – 100 %	5 %	✓	✓	✓	✓
Reverse Acceleration	10 – 70 %	70 %	✓	✓	✓	✓
Reverse Deceleration	15 – 100 %	30 %	✓	✓	✓	✓
Turning Speed @ Maximum	20 – 100 %	N/A	✓	✓	✓	✓
Turning Speed @ Minimum	5 – 100 %	5 %	✓	✓	✓	✓
Turning Acceleration	10 – 70 %	40 %	✓	✓	✓	✓
Turning Deceleration	15 – 100 %	70 %	✓	✓	✓	✓
Non-Linear Turn	No / Yes	No	-		✓	✓
Turn Damping	10 – 100 %	40%	-	✓	✓	✓
Speed Damping	5 – 100 %	40 %	-	✓	✓	✓


Parameter	Possible Values	Default	HHP	Life	Std	Adv
Soft-Start Acceleration	100 – 200 %	200 %	-	✓	✓	✓
Soft-Start Time	100 – 200 %	100 %	-	✓	✓	✓
Min To Max Decel Ratio	4 – 100 %	20 %	-	✓	✓	✓
Load Compensation Response	0 – 100 %	100 %	✓	✓	✓	✓
Grip	5 – 100 %	100%	✓	✓	✓	✓
Speed x Turn for Grip	5 – 100 %	100 %	-			✓
Accel Out Of A Turn For Grip	0 – 200 %	100 %	-			✓
Accel Into A Turn For Grip	0 – 200 %	100 %	-			✓
Turning @ Full Speed	5 – 100 %	100 %	-			✓
Turning Accel @ Full Speed	100 – 300 %	100 %	-			✓
System Settings						
Actuator System Type	CLAM or TAM DX2 Actuators	DX2 Actuators	-		✓	✓
Actuator System is Critical	Yes/No	No	-		✓	✓
Actuator System Missing	Stop Drive Slowdown Drive	Stop Drive	-		✓	✓
System Slowdown (CLAM Slowdown)	0 – 100 %	20 %	-		✓	✓
Neutral to PB Delay	20 – 5000 ms	100 ms	-			✓
Chair Speed Enable	No / Yes	No	-		✓	✓
Chair Speed	0 - 10	10	✓	✓	✓	✓
CANH Power Switch	No / Yes	Yes	-		✓	✓
CAN Terminator	No / Yes	Yes	-		✓	✓
UCM Joystick Swap Left/Right	No / Yes	No	-		✓	✓
Rotate UCM Joystick	No / Yes	No	-		✓	✓
ACU Enable	No / Yes	Yes	-		✓	✓
ACU Joystick Swap Left/Right	No / Yes	No	-		✓	✓
RJM Enable	No / Yes	Yes	-		✓	✓
RJM Joystick Swap Left/Right	No / Yes	No	-		✓	✓
RJM has Analog Joystick	No / Yes	Yes	-		✓	✓

Parameter	Possible Values	Default	HHP	Life	Std	Adv
Actuator Settings (CLAM/TAM)						
Actuator While Driving	No / Yes	No	-		✓	✓
Actuator 1 Enable	No / Yes	Yes	-		✓	✓
Actuator 2 Enable	No / Yes	Yes	-		✓	✓
Actuator 3 Enable	No / Yes	Yes	-		✓	✓
Actuator 4 Enable	No / Yes	Yes	-		✓	✓
Actuator 3 + 4 Enable	No / Yes	Yes	-		✓	✓
Actuator 1 Current Limit	2.1 - 14 A	6.1 A	-		✓	✓
Actuator 2 Current Limit	2.1 - 14 A	6.1 A	-		✓	✓
Actuator 3 Current Limit	2.1 - 14 A	6.1 A	-		✓	✓
Actuator 4 Current Limit	2.1 - 14 A	6.1 A	-		✓	✓
Actuator Timeout	1 – 120 s	30 s	-		✓	✓
Actuator Open Circuit Test	No / Yes	No	-		✓	✓
Lighting Settings (CLAM/LM/LMZ) – REMB only						
CLAM Lighting Enable	No / Yes	Yes	-		✓	✓
Lighting Module Enable	No / Yes	No	-		✓	✓
Lighting Module is Critical	No / Yes	Yes	-			✓
Side Lights Enable	No / Yes	Yes	-		✓	✓
Indicators Enable	No / Yes	Yes	-		✓	✓
Hazard Lights Enable	No / Yes	Yes	-		✓	✓
Remember Hazard State	No / Yes	Yes	-			✓

Parameter	Possible Values	Default	HHP	Lite	Std	Adv
Remote Control Settings (ARC/RSM)						
ARC Enable	No / Yes	No	-		✓	✓
ARC Channel 1&2	Actuator 1&2 ARC Switch Drive ARC Switch Drive + Act. 1&2 in Prof. 0	Actuator 1&2	-		✓	✓
ARC Channel 3	Actuator 3 L+R Indicator	Actuator 3	-		✓	✓
ARC Channel 4	Actuator 4 Horn + Light	Actuator 4	-		✓	✓
ARC Channel 5	Actuator 5 Profile Up + Profile Down	Profile Up + Profile Down	-		✓	✓

4.1.1 ACS2 User Options

4.1.1.1 Power-Up Profile Number

Parameter	Possible Values	Default	HHP	Lite	Std	Adv
Power-Up Profile Number	Last used Profile Profile 1 Profile 2 Profile 3 Profile 4 Profile 5 Profile 0	Last used	-		✓	✓

The **Power-up Profile Number** is the Profile in which the DX System will start when the system is switched on. If Power-up Profile Number is set to 'Last Used Profile', the DX System will start up with the same Drive Profile that was active when the DX System was switched off.

4.1.1.2 Indicator Auto-cancel

Parameter	Possible Values	Default	HHP	Lite	Std	Adv
Indicator Auto Cancel	Off 5 s 10 s 20 s	Off	-	✓	✓	✓

Off - After the indicator lights are switched on, they will stay on until the user switches them off or the user powers down the system.

5 – 20 - After the indicator lights are switched on, they will automatically switch off after **Indicator Auto-cancel** seconds.

4.1.1.3 LED Test Pattern

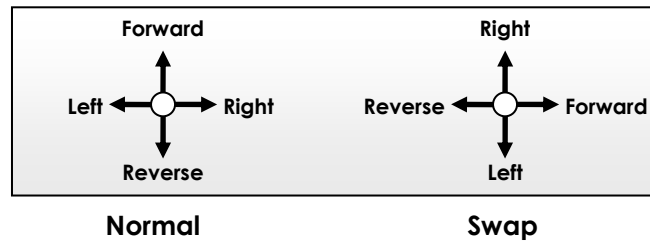
Parameter	Possible Values	Default	HHP	Lite	Std	Adv
LED Test Pattern	Yes/No	No	-	✓	✓	✓

If this parameter has the value 'Yes', the ACS2 will flash all display LEDs on power up.

4.1.1.4 Axis Swap in Actuator Mode

Parameter	Possible Values	Default	HHP	Lite	Std	Adv
Axis Swap in Actuator mode	Yes/No	No	-	✓	✓	✓

This parameter can swap 'joystick forward' with 'joystick right' and 'joystick down' with 'joystick left'. Use this to adapt the navigation of the actuator menu to the preference of the user.



This parameter has no effect on normal driving operation.

4.1.1.5 Reversing Beeper

Parameter	Possible Values	Default	HHP	Lite	Std	Adv
Reversing Beeper	Yes/No	No	-	✓	✓	✓

If this parameter has the value 'Yes', the ACS2 will sound the horn once every second while the powerchair drives in reverse.

4.1.1.6 Mode Change Beep

Parameter	Possible Values	Default	HHP	Lite	Std	Adv
Mode Change Beep	Yes/No	No	-	✓	✓	✓

If this parameter has the value 'Yes', the ACS2 will produce an audible beep (or two) in the following instances:

- Power on
- Power off
- Lock
- Unlock
- Sleep
- Drive Profile change
- Accessory menu change

4.1.2 Added/changed DX System parameters


4.1.2.1 Joystick Angle Compensation

Parameter	Possible Values	Default	HHP	Lite	Std	Adv
Joystick Angle Compensation	-90° to +90°	0°	✓	✓	✓	✓

If a user has difficulty with deflecting the joystick straight forward, **Joystick Angle Compensation** can correct for the amount of out-of-centre joystick deflection.

Joystick Angle Compensation must be set for every Drive Profile separately. The value only applies to the joystick that is used in that particular Drive Profile.

Different angle compensations can be applied to different joysticks. For example: the user joystick can be compensated while the attendant joystick is not compensated.



Notes:

1. If more than one Drive Profile is used for a particular joystick and the value of **Joystick Angle Compensation** differs between these Drive Profiles, the wheelchair user may experience confusion and drive erratically.
2. The value of **Joystick Angle Compensation** is additional to the value set by **Rotate Joystick 90°** (see 4.1.2.4)
3. Do not use **Veer Compensation** (see DSM section 4.3) to compensate for out-of-centre joystick deflection by the user.

4.1.2.2 Joystick Swap Forward/Reverse

Parameter	Possible Values	Default	HHP	Lite	Std	Adv
Joystick Swap Forward/Reverse	Yes/No	No	-	✓	✓	✓

If this parameter is set to 'Yes', the forward and reverse operation of the joystick is swapped.



Set **Joystick Swap Forward/Reverse** to 'Yes' if a remote is mounted in a reverse orientation.

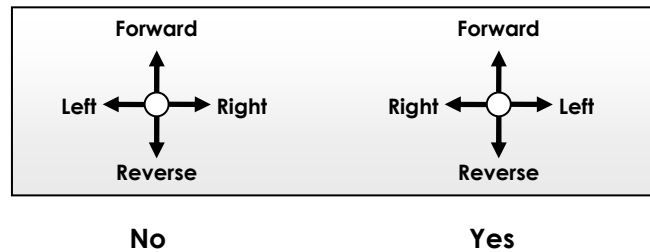
Joystick Swap Forward/Reverse must be set for every Drive Profile separately. The value only applies to the joystick that is used in that particular Drive Profile.

Different settings can be applied to different joysticks. For example: the attendant joystick can be forward-reverse swapped while the user joystick is not swapped.

4.1.2.3 Joystick Swap Left/Right

Parameter	Possible Values	Default	HHP	Lite	Std	Adv
Joystick Swap Left/Right	Yes/No	No	-	✓	✓	✓

If this parameter is set to 'Yes', the left and right operation of the joystick is swapped.



Set **Joystick Swap Left/Right** to 'Yes' if a remote is mounted

- upside-down (for example with chin or tray applications)
- vertically to give forward driving when the joystick is deflected down.

Joystick Swap Left/Right must be set for every Drive Profile separately. The value only applies to the joystick that is used in that particular Drive Profile.

Different settings can be applied to different joysticks. For example: the user joystick can be left-right swapped while the attendant joystick is not swapped.

4.1.2.4 Rotate Joystick 90°

Parameter	Possible Values	Default	HHP	Lite	Std	Adv
Rotate Joystick 90°	Yes/No	No	-	✓	✓	✓

If this parameter is set to 'Yes', the operation of the joystick is rotated by 90°.



Rotate Joystick 90° must be set for every Drive Profile separately. The value only applies to the joystick that is used in that particular Drive Profile.

Different settings can be applied to different joysticks. For example: the user joystick can be rotated while the attendant joystick is not rotated.

To rotate the other way around (Forward → Left), set **Joystick Swap Forward/Reverse** (4.1.2.2) and **Joystick Swap Left/Right** (4.1.2.3) to 'Yes' as well.

4.1.2.5 Load Compensation Response

Parameter	Possible Values	Default	HHP	Lite	Std	Adv
Load Compensation Response	0 – 100 %	100 %	✓	✓	✓	✓

Load Compensation Response lowers the **Load Compensation** value when the powerchair drives at higher speeds. At lower speeds, the **Load Compensation** setting is not affected.

This makes it possible to set a **Load Compensation** value that is high enough to provide zero rollback and fast response at a low speed, while a soft response setting retains smooth control at higher speeds.



Note:

*This parameter is only used if the DX System has a DX2 Power Module and the **LC Response Profiled** parameter (located in the 'Motor Options' section) is set to 'Yes'. Otherwise, this parameter is ignored.*


For more information, see the installation manual of the DX2 Power Module.

If the **LC Response Profiled** parameter is set to 'Yes', the value of Load Compensation Response is set with the **Load Compensation Response** parameter for each individual Drive Profile separately. This provides the flexibility to create responsive Drive Profiles as well as smooth Drive Profiles in one wheelchair program, for example, a responsive sports profile and a smooth cruising profile.

Alternatively, if **Load Compensation Response** has the value 0 or 100, the Drive Profile uses the value of the **LC Response Default** parameter that has been set by the OEM to provide a suitable default for the chair design.

- 0** - Profiled response disabled, use **LC Response Default** value for this profile
- 1 – 50** - Too low; not recommended
- 50 – 70** - Soft response
- 70 – 90** - Normal response
- 90 – 99** - Hard response
- 100** - Profiled response disabled, use **LC Response Default** value for this profile

4.1.2.6 Actuator System Type

Parameter	Possible Values	Default	HHP	Lite	Std	Adv
Actuator System Type	CLAM or TAM DX2 Actuators	DX2 Actuators	-		✓	✓

It is not possible to use a CLAM/TAM and a DX2 Actuator Module simultaneously in a DX System.


CLAM or TAM - The CLAM or TAM Module is enabled. The DX2 Actuator Modules will not be detected, even if they are connected to the DX System.

DX2 Actuators - The CLAM or TAM Module is disabled and will not be detected, even if it is connected to the DX System. The DX2 Actuator Modules will be detected successfully if they are connected to the DX System.

**Note:**

A Wizard program (template) that is set up to include DX2 Actuator Modules is required to configure the operation of the DX2 Actuator System.

4.1.2.7 Actuator System is Critical


Parameter	Possible Values	Default	HHP	Lite	Std	Adv
Actuator System is Critical	Yes/No	No	-		✓	✓

Yes - The DX System slows down or stops the powerchair (depending on the value of **Actuator System Missing**) if the DX System cannot detect the actuator system that has been set by **Actuator System Type**, or communication with the actuator system is lost.

No - The DX System considers the actuator system as optional and allows the powerchair to drive normally, whether or not an actuator system is detected.

Actuator System is Critical is normally set to 'No', unless the actuator system performs safety critical tasks such as slowing down or stopping the chair in some seating positions.

4.1.2.8 Actuator System Missing

Parameter	Possible Values	Default	HHP	Lite	Std	Adv
Actuator System Missing	Stop Drive Slowdown Drive	Stop Drive	-		✓	✓

If the DX System can not detect the actuator system that has been set by **Actuator System Type**, and **Actuator System is Critical** has the value 'Yes', the DX System performs the following action, depending on the value of **Actuator System Missing**:

Stop Drive - The DX System does not allow the powerchair to drive and generates a Module Fault (flash code 1).




Slowdown Drive - The DX System reduces all speeds by the value of the **System Slowdown** parameter.

If **Actuator System is Critical** has the value 'No', the value of **Actuator System Missing** is ignored.

5 Appendices

5.1 Programming Accessories

Dynamic DX Programming Accessories

Part Description	DC Part #	Qty/Unit	
Wizard Kit – Programming Kit Contains software, cables and DWIZ-ADAPT adapter (no dongle)	DWIZ-KIT	1	
Wizard – Software Only (CD)	DWIZ-SW	1	
Wizard Dongles – USB port			
OEM/Advanced version	DWD-OEM-U	1	
Enhanced dealer/Standard version	DWD-EDL-U	1	
Dealer/Lite version	DWD-DLR-U	1	
Factory version	DWD-FAC-U	1	
DX Hand Held Programmer	DX-HHP	1	
Programming cable adapter	DWIZ-ADAPT	1	



Note:

The DX2 ACS2 does not have a separate programming connector. Program the DX2 ACS2 through the charging connector. To connect the Wizard or the DX-HHP to the XLR charging connector, a DWIZ-ADAPT adapter is needed.

5.2 Intended Use and Regulatory Statement

Intended Use

The DX2-REMA/B-ACS2 is a module of the DX system intended to allow powered wheelchair users interaction with the DX System.

The DX System is a family of modules intended to control powered wheelchairs. The DX System offers flexibility in integrating compatible input and output devices, as configured and connected, and provides extensive adaptability to meet specific user needs through optimal programmability.

The DX System is intended to operate powered wheelchairs utilising 24V motors with integrated parkbrakes.

The powerchair manufacturers are provided with the integration, set-up, operating environment, test and maintenance information needed to ensure reliable and safe use of the DX System.

Device Classification

Europe

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

USA

The DX System 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 DX System and all its modules have been designed to enable the powerchair manufacturer to comply with the relevant requirements of the European Medical Device Directive 93/42/EEC and 21 CFR § 820.

The DX System and all its modules have been designed such that the combination of the wheelchair and the DX System, along with accessories as applicable, complies with the Essential Requirements of the MDD by adopting relevant clauses of harmonised standards EN12184 and EN12182 and the FDA Consensus standard ISO 7176 for performance.

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

5.3 Maintenance

1. Keep all DYNAMIC electronic components free of dust, dirt and liquids. For cleaning the product, use a cloth dampened with warm soapy water. Do not use chemicals, solvents or abrasive cleaners, as this may cause damage to the product.
2. Regularly check all vehicle components for loose, damaged or corroded components such as connectors, terminals, or cabling. Restrain all cables to protect them from damage. Replace damaged components.
3. Regularly test all switchable functions on the DYNAMIC electronics system to ensure they function correctly.
4. There are no user-serviceable parts in any DYNAMIC electronic component. Do not attempt to open any case or undertake any repairs, else warranty will be voided and the safety of the system may be compromised.
5. Where any doubt exists, consult your nearest service centre 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.

5.4 Warranty

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

This warranty is subject to the provisions that the equipment:

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

5.5 Safety and Misuse Warnings

The DX2 ACS2 is part of the DX System and therefore all safety and misuse warnings that appear in the DX System Manual apply to the DX2 ACS2 as well. See DSM section 10.4.

Additional warnings to be included in the User Manual

The following warnings must be passed on to the operator of the vehicle before use of the product.

- In the case of an emergency while the vehicle is driving, press the On/Off button to perform an emergency stop and turn the system off.
- When you operate the joystick, make sure that your hands and fingers stay on or above the Joystick Skirt.
- If operators of the vehicle are left with limited or no mobility because the vehicle loses electric power or breaks down, it is important that they can still call for assistance from wherever they may be.
- Do not store or operate the DX2 ACS2 at a temperature that is outside the temperature ranges specified in this manual.

Service and Configuration Warnings

The following warnings are applicable to the installer and therapist only.

- It is the responsibility of the therapist/ installer to minimize any risk of use error, including those arising from ergonomic features and/or the environment in which the device is intended to be used.
- The DX2 ACS2 is designed for persons with good cognitive abilities. Users must also be able to move their head around reflections of ambient light on the display.
- The chair set up and configuration process should take into consideration the
 - technical knowledge, experience and education, and
 - medical and physical condition, including the level of disability and capability of each individual user.
- Prior to handing over the vehicle, make sure that users are fully able to operate the product by providing them appropriate training on functionality and safety features, and having them test-drive the vehicle in a safe area in the presence of their agent.

5.6 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.

Minimising emissions

To minimise emissions and to maximise the immunity to radiated fields and ESD, follow the general wiring recommendations in section 2.1.1 of the DX System Manual.

5.7 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.

Do not dispose of this product in fire.

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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.

Regional centres are located in Europe, United States, Asia, and Australasia.

ISO 13485 certified –

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