



About this Manual

This manual can help you understand and install the Dynamic DX2-REM420/421. 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-REM420/REM421

The DX2-REM420/REM421 (REM42x) is the latest addition to the DX2 range.

The REM42x 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 REM42x 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.**

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2 REM42x Operation

2.1 The Keypad



DX2-REM420



*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



To turn off the DX System



*If <u>Mode Change Beep</u> (see 4.1.1.6) is set to 'Yes' **If <u>LED Test Pattern</u> (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)



*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 REM42x 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

> 4 s	Press the on/off button for 4 seconds when the DX System is turned on.	
Ċ	 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

Ċ	Press the on/off button.The Lock LED will flash for 10 seconds to indicate that the DX System is locked.	10 s
2 x	Press the horn button twice within 10 seconds.	
	• The DX System will turn on normally.	< 10 s → on
	If the horn button is not pressed within 10 seconds, the DX System will turn off again.	> 10 s → off

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





2.3 Driving

2.3.1 The Joystick



2.3.2 The Drive Profile



The REM42x 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.
ĥ	Attendant Drive Profile (Drive Profile 6). See also <u>Attendant Mode</u> (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

Press the horn button.

• 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, sit 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 2 3

Select the seating function

Press '+' or move the joystick right to select the next seating function.	$\textcircled{1}_{2} \textcircled{3}^{\textcircled{1}} \rightarrow \textcircled{1}_{2} \textcircled{3}^{\textcircled{1}}$
Press '-' or move the joystick left to select the previous seating function.	$\textcircled{1}_{2} \textcircled{3}_{3} \xrightarrow{1}_{2} \textcircled{3}_{3} \textcircled{3}_{3}$

Operate the seating function



Return to the Driving Mode



the Seating Mode was activated.

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

Note: The orientat Actuator Mo Forward / Re The descript have the vo

The orientation of the joystick depends on the value of the <u>Axis Swap in</u> <u>Actuator Mode</u> (4.1.1.4), <u>RotateJoystick 90°</u> (4.1.2.4), <u>Joystick Swap</u> <u>Forward / Reverse</u> (4.1.2.2), and <u>Joystick Swap Left / Right</u> (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

Actuator Function Meaning LEDs 1 4 Seating Function 1 selected 2 0 4 Seating Function 2 selected 3 2 1 4 Seating Function 3 selected 3 1 4 Seating Function 3 and 4 selected* 3 4 Seating Function 4 selected

The REM42x can operate 4 seating functions.

Only actuators that have been enabled and detected are shown.

12	*Note:
	If The REM42x 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 REM42x 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 REM42x, 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.

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2.6 The Lights (DX2-REM420 only)

To operate the lights

 Press the side light button to switch the side/positioning lights on or off. The side light LED is on when the side lights are switched on. 	
 Press the indicator buttons to switch the indicators on or off. The indicator LEDs flash at the same rate as the indicator lights. The indicators will switch off automatically *. 	
 Press the hazard light button to switch the hazard lights on or off. 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'.



Notes:

1. It is only possible to operate lights that have been enabled and detected.

2. 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 REM42x. 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 REM42x.

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 REM42x.

12	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.
	If the DX System is turned off or goes into sleep mode while charging, charging will continue.
	Warnings:
	 Do not disconnect the batteries or open the circuit breaker during charging. See the manual of the battery charger for more information.
	 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.
	 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.



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.



The Fault Indicator LED flashes the same number of times as the flash code number. For a description of the flash codes, see <u>Flash Codes</u> (section 2.8.3).

If the fault is located within the REM42x 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
		The internal communication of the DX System has been lost. • Turn off the DX System, and then turn it on again.
1	DX Module	 The DX BUS connection of a DX Module is faulty. Check the DX BUS cables and the DX BUS connections, and then turn the DX System off and on.
		If the Status LED on another Module is flashing too, there may be an internal fault in that Module. • Contact your dealer.
2	DX	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. • Move the seat back to the neutral position.
	Accessory	 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 '+'. Check all accessory devices connected to your DX System.
3/4	Motors	 The motor is not connected to the Power Module, or there is a short-circuit in the motor connection. 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
		The parkbrake has been released manually.Enable the parkbrake, and then turn the DX System off and on
5/6	Parkbrakes	 The parkbrake is not connected to the Power Module, or there is a short-circuit in the parkbrake connection. Check that the motor cables are not loose or damaged Contact your dealer
7	Battery voltage too low	 The battery voltage is too low. The most probable cause of this fault is a loose battery terminal. 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
		 The battery voltage is too high. The batteries may be overcharged If driving downhill, slow down and turn on the lights (if fitted)
8	Battery Voltage too high	defective or not adjusted correctly.Contact your dealer
		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. • Check the battery cables and connectors.
DX BUS		 If the Hazard Lights were already switched on when the DX System was turned on, sometimes Flash Code 10 occurs. Turn off the Hazard Lights, turn off the DX System then turn the DX System on again.
//10	cable fault	 An invalid voltage has been detected on the DX BUS. Your chair will still drive, but it drives slower. Check the DX BUS cables for damage. Contact your dealer.
11	Stall Timeout	 The motor current has been at the maximum value for too long. The motors may not be strong enough for the chosen route (the route is too steep). 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. Make sure that the wheels can turn freely. The motors may be faulty. Have the motor(s) checked by a service technician.
12	Module Mismatch	 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. 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 REM42x does not work. Only the joystick on the DX-ACU is operational.

All the buttons of the REM42x 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 REM42x is pushed while a seating function is selected, the REM42x 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 REM42x 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-m	oulded plast	C						
Protection Rating	IPx4								
Shipping Weight	650 g (exclu	Jding packir	g 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 REM42x 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.





Mount the DX2 REM42x 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 REM42x is not waterproof. Make sure to protect the REM42x from water entry if necessary.

3.3 REM42x connection with the DX System

The DX BUS connector socket is located at the back of the REM42x.





Warning:

The REM42x 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 REM42x both have a backup copy of all the system programmable parameters. If either the REM42x or the DX2 Power Module is replaced, the REM42x 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 REM42x are not the same, the REM42x flashes actuator LEDs 1 and 4 simultaneously.



Select the REM42x as the source





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



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 REM42x into the Power Module. This process is called 'Auto Download'. See the DX System Manual for more information about Auto Download.



4 Programming the REM42x



Warning:

The DX2 REM42x 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 REM42x manual only describes REM42x-specific programming.

The XLR programming / charger socket is located at the front of the REM42x. To use this socket with the HHP or the PC-Wizard programming cable, a DWIZ-ADAPT adapter plug is needed.



The DX2 REM42x uses UCM Rev. D software (for software revisions see DSM section 5.1.1). This revision adds several DX2 System parameters and REM42x-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
- Grey Look in the DX System Manual for the description of this parameter

Parameter	Possible Values	Default	HHP	Lite	Std	Adv
REM42x User Options						
Lock Enable	Yes/No	No	-	\checkmark	\checkmark	\checkmark
Drive Delay at Power-Up (s)	0 - 10 s	0 s	-	\checkmark	\checkmark	\checkmark
Disable OONAPU Faults	Yes/No	No	-	\checkmark	\checkmark	\checkmark
Maximum Profile Number	1 – 5	5	-	\checkmark	\checkmark	\checkmark
Allow non-driving profile	Yes/No	No	-		٢	\checkmark
Power-Up Profile Number	Last used Profile Profile 1 Profile 2 Profile 3 Profile 4 Profile 5 Profile 0	Last used	-	٩	*	~
Wrap Profiles	Yes/No	Yes	-	6	٢	\checkmark
Change Profile While Driving	Yes/No	No	-		\checkmark	\checkmark
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 %	-	\checkmark	\checkmark	\checkmark
Joystick Source	Master ACU RJM Display ARC ExtNV1 ExtNV2 None	Master	_	\checkmark	\checkmark	~
Neutral Maximum	10 – 50 %	10 %	-	\checkmark	\checkmark	\checkmark
Short Throw Shape	100 - 200 %	200 %	-	\checkmark	\checkmark	\checkmark
Short Throw Travel	100 - 200 %	100 %	\checkmark	\checkmark	\checkmark	\checkmark
Joystick Angle Compensation	-90° to +90°	0°	~	\checkmark	~	~
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	-	\checkmark	\checkmark	\checkmark
Sleep Timeout	1 – 60 min	5 min	-	\checkmark	\checkmark	\checkmark
Enable Joystick Wakeup	Yes/No	Yes	-	\checkmark	\checkmark	\checkmark
Drive Profiles						
Forward Speed @ Maximum	10 – 100 %	N/A	\checkmark	\checkmark	\checkmark	\checkmark
Forward Speed @ Minimum	5 - 100 %	5 %	\checkmark	\checkmark	\checkmark	\checkmark
Forward Acceleration	10 – 70 %	40 %	\checkmark	\checkmark	\checkmark	\checkmark
Forward Deceleration	15 – 100 %	60 %	\checkmark	\checkmark	\checkmark	\checkmark
Reverse Speed @ Maximum	10 – 100 %	N/A	\checkmark	\checkmark	\checkmark	\checkmark
Reverse Speed @ Minimum	5 - 100 %	5 %	\checkmark	\checkmark	\checkmark	\checkmark
Reverse Acceleration	10 – 70 %	70 %	\checkmark	\checkmark	\checkmark	\checkmark
Reverse Deceleration	15 – 100 %	30 %	\checkmark	\checkmark	\checkmark	\checkmark
Turning Speed @ Maximum	20 – 100 %	N/A	\checkmark	\checkmark	\checkmark	\checkmark
Turning Speed @ Minimum	5 – 100 %	5 %	\checkmark	\checkmark	\checkmark	\checkmark
Turning Acceleration	10 – 70 %	40 %	\checkmark	\checkmark	\checkmark	\checkmark
Turning Deceleration	15 – 100 %	70 %	\checkmark	\checkmark	\checkmark	\checkmark
Non-Linear Turn	No / Yes	No		0	\checkmark	\checkmark
Turn Damping	10 – 100 %	40%	-	\checkmark	\checkmark	\checkmark
Speed Damping	5 - 100 %	40 %	-	\checkmark	\checkmark	\checkmark

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Parameter	Possible Values	Default	HHP	Lite	Std	Adv
Soft-Start Acceleration	100 – 200 %	200 %	-	\checkmark	\checkmark	\checkmark
Soft-Start Time	100 - 200 %	100 %	-	\checkmark	\checkmark	\checkmark
Min To Max Decel Ratio	4 – 100 %	20 %	-	\checkmark	\checkmark	\checkmark
Load Compensation Response	0 – 100 %	100 %	~	~	✓	~
Grip	5 – 100 %	100%	\checkmark	\checkmark	\checkmark	\checkmark
Speed x Turn for Grip	5 – 100 %	100 %	-	0	0	\checkmark
Accel Out Of A Turn For Grip	0 – 200 %	100 %	-	٢	6	\checkmark
Accel Into A Turn For Grip	0 – 200 %	100 %	-	٢	٩	\checkmark
Turning @ Full Speed	5 – 100 %	100 %		6	6	\checkmark
Turning Accel @ Full Speed	100 – 300 %	100 %	-	٢	0	\checkmark
System Settings						
Actuator System Type	CLAM or TAM DX2 Actuators	DX2 Actuators	-	9	~	~
Actuator System is Critical	Yes/No	No	-	9	\checkmark	~
Actuator System Missing	Stop Drive Slowdown Drive	Stop Drive	-	٩	✓	~
System Slowdown (CLAM Slowdown)	0 – 100 %	20 %		٢	\checkmark	\checkmark
Neutral to PB Delay	20 – 5000 ms	100 ms	-	3	9	\checkmark
Chair Speed Enable	No / Yes	No	-	3	\checkmark	\checkmark
Chair Speed	0 - 10	10	\checkmark	\checkmark	\checkmark	\checkmark
CANH Power Switch	No / Yes	Yes	-	0	\checkmark	\checkmark
CAN Terminator	No / Yes	Yes	-	3	\checkmark	\checkmark
UCM Joystick Swap Left/Right	No / Yes	No		٢	\checkmark	\checkmark
Rotate UCM Joystick	No / Yes	No	-	٢	\checkmark	\checkmark
ACU Enable	No / Yes	Yes	-	٩	\checkmark	\checkmark
ACU Joystick Swap Left/Right	No / Yes	No	-	٢	\checkmark	\checkmark
RJM Enable	No / Yes	Yes	-	٢	\checkmark	\checkmark
RJM Joystick Swap Left/Right	No / Yes	No	_	٢	\checkmark	\checkmark
RJM has Analog Joystick	No / Yes	Yes	-	0	\checkmark	\checkmark

Parameter	Possible Values	Default	HHP	Lite	Std	Adv
Actuator Settings (CLAM/TAM)						
Actuator While Driving	No / Yes	No	-	٢	\checkmark	\checkmark
Actuator 1 Enable	No / Yes	Yes	-	٢	\checkmark	\checkmark
Actuator 2 Enable	No / Yes	Yes	-	٢	\checkmark	\checkmark
Actuator 3 Enable	No / Yes	Yes	-	٢	\checkmark	\checkmark
Actuator 4 Enable	No / Yes	Yes	-	٢	\checkmark	\checkmark
Actuator 3 + 4 Enable	No / Yes	Yes	-	٢	\checkmark	\checkmark
Actuator 1 Current Limit	2.1 - 14 A	6.1 A	-	۲	\checkmark	\checkmark
Actuator 2 Current Limit	2.1 - 14 A	6.1 A	-	٢	\checkmark	\checkmark
Actuator 3 Current Limit	2.1 - 14 A	6.1 A	-	٢	\checkmark	\checkmark
Actuator 4 Current Limit	2.1 - 14 A	6.1 A	-	٢	\checkmark	\checkmark
Actuator Timeout	1 – 120 s	30 s	_	٢	\checkmark	\checkmark
Actuator Open Circuit Test	No / Yes	No	-	٢	\checkmark	\checkmark
Lighting Settings (CLAM/LM/LMZ) – REMB only						
CLAM Lighting Enable	No / Yes	Yes	-	۲	\checkmark	\checkmark
Lighting Module Enable	No / Yes	No	-	٢	\checkmark	\checkmark
Lighting Module is Critical	No / Yes	Yes	-	٢	٢	\checkmark
Side Lights Enable	No / Yes	Yes	_	٢	\checkmark	\checkmark
Indicators Enable	No / Yes	Yes	-	٢	\checkmark	\checkmark
Hazard Lights Enable	No / Yes	Yes	-	٢	\checkmark	\checkmark
Remember Hazard State	No / Yes	Yes	-	٢	٢	\checkmark

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Parameter	Possible Values	Default	HHP	Lite	Std	Adv
Remote Control Settings (ARC/RSM)						
ARC Enable	No / Yes	No	-	١	\checkmark	\checkmark
ARC Channel 1&2	Actuator 1&2 ARC Switch Drive ARC Switch Drive + Act. 1&2 in Prof. 0	Actuator 1&2	-	٢	~	~
ARC Channel 3	Actuator 3 L+R Indicator	Actuator 3	_	٢	\checkmark	\checkmark
ARC Channel 4	Actuator 4 Horn + Light	Actuator 4			\checkmark	\checkmark
ARC Channel 5	Actuator 5 Profile Up + Profile Down	Profile Up + Profile Down	-	٢	\checkmark	\checkmark



4.1.1 REM42x 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	-	0	~	~

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 REM42x will flash all display LEDs on power up.

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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	-	~	\checkmark	~

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 REM42x 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 REM42x 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.

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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 \rightarrow Left), set <u>Joystick Swap Forward/Reverse</u> (4.1.2.2) and <u>Joystick Swap Left/Right</u> (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.



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	-	6	✓	~

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	-	9	~	~

- Yes The DX System slows down or stops the powerchair (depending on the value of <u>Actuator System Missing</u>) if the DX System cannot detect the actuator system that has been set by <u>Actuator System Type</u>, 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	-	6	~	~

If the DX System can not detect the actuator system that has been set by <u>Actuator</u> <u>System Type</u>, and <u>Actuator System is Critical</u> 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 <u>Actuator System is Critical</u> has the value 'No', the value of Actuator System Missing is ignored.

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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	cynamic et the magic WIZARD 5				
Wizard – Software Only (CD)	DWIZ-SW	1					
Wizard Dongles – USB port							
OEM/Advanced version Enhanced dealer/Standard version Dealer/Lite version Factory version	DWD-OEM-U DWD-EDL-U DWD-DLR-U DWD-FAC-U	1 1 1 1					
DX Hand Held Programmer	DX-HHP	1	2000 C				
Programming cable adapter	DWIZ-ADAPT	1					



Note:

The DX2-REM42x does not have a separate programming connector. Program the DX2-REM42x 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-REM420/REM421 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.

The DX System is classified as 'wheelchair component' under 21 CFR 890.3920, Class 1 (General Controls), with Product Code KNN.

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 QSR 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 ANSI/RESNA 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

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

- 1. Keep all DYNAMIC electronic components free of dust, dirt and liquids. To clean 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 the joystick gaiter for punctures and wear that might allow dirt or small objects to enter into the remote. If a gaiter is damaged, have it replaced by a competent service technician.
- 3. Regularly check all vehicle components for loose, damaged or corroded components, such as connectors, terminals, or cables. Restrain all cables to protect them from damage. Replace damaged components.
- 4. Regularly test all switchable functions on the DYNAMIC electronics system to ensure they function correctly.
- 5. 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.
- 6. If all maintenance instructions as described above have been properly followed, the expected service life (i.e. minimum serviceable life expectancy) of the product is five (5) years. After this period, the product must be thoroughly checked by an authorized dealer / service agent to confirm that the unit continues to operate correctly and safely.
- 7. Where any doubt exists, consult your nearest service centre or agent.



Warning:

It is the responsibility of the end-user to maintain the unit in a state of good repair at all times. Prolonged exposure to direct sunlight or certain solvents or household chemicals may cause damage to plastic components, resulting in loss of functionality or deterioration in performance.

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-REM42x is part of the DX System and therefore all safety and misuse warnings that appear in the DX System Manual apply to the DX2-REM42x 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-REM42x 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-REM42x 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.



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