



DX SYSTEM MANUAL ADDENDUM GBK62495: Issue 1 - March 2014

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DX-SKT-X3 DX Bus Expander



About this Addendum

This addendum will help you understand and install the DYNAMIC DX-SKT-X3 DX Bus Expander. 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.

The latest version of this manual can be downloaded from the Dynamic Controls website: www.dvnamiccontrols.com

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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2 Introduction to the DX Bus Expander

The DX Bus is the interface that connects all the DX/DX2 components together. The DX-SKT-X3 DX Bus Expander is an expansion block that allows the connection of additional, multiple modules in a DX/DX2 rehabilitation wheelchair system. It replaces both the DX Bus Y-Cable (GCB65231) and the 4-way DX Bus socket (DX-SKT-X4).



Figure 1: DX-SKT-X3 DX Bus Expander

The DX-SKT-X3 is compatible with DX and DX2 modules and expands the DX Bus by adding three DX Bus socket connectors and a single DX Bus flying lead connector.



Figure 2: DX Modules connected using a DX Bus Expander



Note:

The DX-SKT-X3 is an accessory for the DX/DX2 System.

This document is an addendum to the DX System Manual and DX/DX2 module installation manuals. Read the DX System Manual and relevant DX/DX2 module installation manuals before reading this addendum.

All warnings and configurations presented in the DX System Manual and relevant DX/DX2 module installation manuals are also applicable to the DX-SKT-X3, except where specifically stated differently in this addendum.





3 Specifications

3.1 Dimensions



Figure 3: DX-SKT-X3 Dimensions

3.2 Specifications

Parameter	Description
Contact Resistance (per contact)	$3 \text{ m}\Omega$ nom, 7 m Ω max
(as per IEC-512-2, Positronic)	
Wire resistance @ 20°C	
DXB+	6.2 ±10% mΩ/m
DXB-	5.9 ±10% mΩ/m
Operating Current (DXB+/DXB-)	12 A nom, 20 A RMS max
(as allowed by DX Bus)	
Mounting torque (M4 bolts)	0.6 Nm
Connector latch holding force	40 N minimum
Cable strain	100 N (accidental, non-repetitive)
Cable Flex Force	10 N max
Cable bend radius	10 mm - fixed installation
	25 mm - occasional flexing (above –10°C)
	50 mm - frequent flexing (above –10°C)
Operating Temperature	–25 °C to +50 °C
(ambient, fixed installation)	–13 °F to +122 °F
Storage Temperature	-40 °C to +65 °C
	-40 °F to +140 °F
Operating Humidity Range	0-90 %RH
Cable Temperature Rating	80 °C / 176 °F (internal operating temp)
Protection rating	IPx4





4 Installation

4.1 Mounting

Mount the DX-SKT-X3 using either, two M4 bolts/screws, or two cable ties. It should be mounted so that the expansion block socket connectors are not facing upwards, that is, they should face horizontally or downwards, in order to prevent water ingress. If the DX-SKT-X3 is to be used for frequent disconnection, mount so that the sockets face downwards.



Figure 4: Mounting Instructions

When the DX-SKT-X3 is connected to the DX Bus, the flying lead connector is live and should be mated with a DX Bus socket to prevent the exposure of live pins.

The mounting position and orientation should give maximum mechanical protection to the DX-SKT-X3, be outside of the wheelchair occupant's reach, and out of the path of water splashes from wheels or cowling.

Failure to adhere to these mounting instructions may lead to water ingress or component damage, which could result in system malfunctions and long-term damage to the unit.







4.2 Wiring

For safe and reliable operation, the installation of the DX-SKT-X3 must follow the basic principles of power wiring.

To maximise performance, minimise EMC emissions, maximise EMC and ESD immunity, and to keep the cabling of the wheelchair safe and tidy, please observe the following guidelines.

- Keep all cables as short as possible.
- The cable must be secured between the connector and any point of flexing so that flexing forces are not transferred to the connector.
- All cables used should be resistant to fire to VW-1 (UL 1581) or similar.
- Avoid wire loops, especially loops of single wires instead of wire pairs.
- Do not route the cables (including the motor cable) near the motor case, where possible.
- Do not leave electrical connections unnecessarily exposed. Insulate exposed connections (for example with sleeving) to reduce the risk of short circuits, exposure to water and connection stress.
- Make sure that all vehicle sub-frames, particularly the motors and controller case, are electrically connected.
- Do not use damaged or abused cables. A damaged cable can potentially produce localised heat, sparks or arcing, and as such it can cause a fire.
- Protect all cables against possible contact with flammable material.

Warning:



- 2. The cable should be adequately routed and secured to prevent pinching, cutting, crushing and chafing from both the mechanics of the chair and external objects.
- 3. Routing must ensure that loose cables are adequately protected against snagging. The cable must be routed so that impact of the chair with external objects does not cause the cable to be damaged.
- 4. The cable size, insulation and connectors should be selected to ensure that any temperature rise during a fault condition does not result in visible damage or temperatures in excess of the dry rated temperature.
- 5. The wheelchair user maintenance schedule and service instructions should include appropriate inspection and maintenance requirements for connectors, cables and wiring. It should also warn against the dangers of poor installation and maintenance of cables.
- 6. Only use the defined contacts, connectors and boots with the wiring looms.
- 7. Ensure all connectors are fully mated.

4.3 Bending and Flexing

When installing the DX-SKT-X3, avoid undue straining of the cable and connection points. Flexing of the cable should be minimised, wherever possible, to extend service life and minimise the risk of accidental damage.

The specified bend / flex radii (see section 3.2 Specifications) are minimums. Use of a cable chain to support the cable, where the cable is subject to regular cyclic bending, is recommended. The force applied to flex the cable should never exceed





10 N. Appropriate life testing should be carried out to determine / confirm the expected service life and inspection & maintenance schedule.

Wa	Warning:			
1.	Where frequent flexing is part of the intended application, the installer must ensure an appropriate bend / flex radius is maintained for the intended and foreseeable environmental conditions.			
2.	The flexibility of the bus loom can reduce at low temperatures, particularly below -10 °C. It is recommended OEMs check their installation is appropriate at low temperatures especially where flexing of the cable is required. For DX-SKT-X3 temperature details, see section 3.2 Specifications.			
3.	Appropriate life testing must be carried out to determine/confirm the expected service life and inspection & maintenance schedule.			

4.4 Electrical Protection

DX/DX2 Power Modules provide electrical overload and short-circuit protection for the DX Bus. A damaged, frayed, crushed or otherwise abused loom can cause a partial short-circuit condition. This condition can cause a current within the normal DX Bus operating range, and below the protection rating of the system.

Wheelchair users must be made aware of the appropriate inspection and maintenance requirements to minimise the risk of such a failure.



Warning:

A damaged cable can potentially produce localised heat, sparks or arcing and become a source of ignition to surrounding flammable material. The installation must ensure that all power cables, including the DX-SKT-X3, are protected against damage and potential contact with flammable materials.

4.5 Live Cable

The DX Bus distributes battery power to DX/DX2 Modules. The cables remain live when the battery is connected, even when the controller is switched off. Frequent disconnection of the cables is not recommended. Particular care should be taken where users may disconnect DX/DX2 modules or cables. Where possible, the installation should discourage the wheelchair user from making a disconnection at the 'live end' of the DX Bus cable.

Warning:

- 1. The flying lead connector is live when the DX-SKT-X3 is connected to a DX Bus and should be mated with a DX Bus socket connector to prevent exposure of live pins.
- 2. Cables with live pins should be restrained.





5 Appendices

The DX-SKT-X3 is a component of the DX System. Please see the appendices of the DX System Manual for all DX System information.

The appendices below only contain DX-SKT-X3-specific information.

5.1 Service life

If the product has not been abused and all maintenance instructions as described in the maintenance section have been properly followed, the expected service life (i.e. minimum serviceable life expectancy) of the product is five (5) years. After this period, product reliability can no longer be guaranteed and Dynamic Controls recommends the product be replaced for safety reasons. Dynamic Controls accepts no responsibility/liability for product failure if the product is continued to be used after the expected service life period has expired.

It is the OEM's responsibility to state the expected service life, as well as the inspection and maintenance schedules for all cables including the DX Bus.

5.2 Labelling

The DX-SKT-X3 is labelled with a revision number and date stamp as indicated in figure 5 below.



Figure 5: DX-SKT-X3 Labelling

5.3 Maintenance

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

 Keep all Dynamic Controls 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.





- Once a month, check all vehicle components for loose, damaged or corroded components, such as connectors, terminals or cables. Ensure that all connectors are fully mated. Restrain all cables to protect them from damage. Replace damaged components. Check for and remove any foreign objects or material.
- Every 6 months, test all switchable functions on the Dynamic Controls electronics system to ensure they function correctly.
- There are no user-serviceable parts in any Dynamic Controls 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.
- 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. 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 Safety and Misuse Warnings

The DX-SKT-X3 DX Bus Expander is part of the DX System therefore all safety and misuse warnings that appear in the DX System Manual apply to the DX-SKT-X3I. See the Safety and Misuse warnings in the DX System Installation manual appendices. In addition the following warning must be passed on to the end user before use of the product.

• Specify the maximum current of any battery chargers to be used with the controller and warn against using battery chargers of higher current ratings.

5.5 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.

See Also: http://www.dynamiccontrols.com/designers-and-manufacturers/compliance



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