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DYNAMIC™

DS100 / DS161

Installation Manual

Important Notes

1. Read this Manual carefully before installing or operating your Controller.

2. Due to continuous product improvement, Dynamic reserves the right to update this Manual. This manual supersedes all previous issues which must not continue to be used.

3. Any attempt to gain access to or in any way abuse the electronic components and associated assemblies that make up the Controller renders the Manufacturer's Warranty void and the Manufacturer free from liability.

CONTENTS

1 INTRODUCTION

The Dynamic DS100 and DS161 are robust, versatile, high power Controllers designed for use in a wide range of DC motor control applications. These Controllers provide exceptional performance on applications that use dual or single motor drives, dual or single direction speed inputs and permanent magnet motors with or without parking brakes. Typical applications include scooters, electric vehicles, stair lifts and conveyor belts.

The power output to the motor is controlled by a full bridge, ultrasonic pulse width modulation circuit. This silently provides smooth transition between forward and reverse directions.

Superior safety features, smooth driving and programmable performance are all provided by the Controller's state-of-the-art micro-controller. A Hand Held Programmer is available to allow performance customization to individual requirements.

The DS100 EMC Controller was developed to comply with the EMC requirements that RFI susceptibility is better than 20V/m and complies with RFI emission standard CISPR 22, class B. The DS161 Controller also complies with these standards.

DS100 non-EMC Controller = DS100xA
DS100 EMC Controller = DS100xB

This Installation Manual provides a description of the DS100, DS161 and the DZ-DS Programmer and also the operation and installation of these in order to achieve optimum performance.

2 GENERAL DESCRIPTION

The DS100 and DS161 Controllers are designed to operate with a nominal 24V battery input and to give a maximum output current of:

- 100 Amps for the DS100, and;
- 160 Amps for the DS161.

The Controllers incorporate motor load compensation which provides precise motor control over a wide range of driving conditions. When used on a scooter for example, whether the vehicle is driven on carpet or an uneven grade, load compensation automatically adjusts the power to the motor to maintain the selected speed. This feature ensures less roll-back when stopping on a slope. The correct level of load compensation depends on the type of motor and the length of wiring, and is easily set using the plug-in Programmer.

The inbuilt micro-controller continually monitors the system to ensure safe and reliable operation.

Safety conditions monitored include:
Speed control system integrity
Internal voltages and circuits
Motor voltages and circuits
Safety isolate relay
Battery voltages.

If the battery voltage is low, the Status Indicator light will flash slowly as a warning to recharge the batteries. If the Controller detects a fault, the light will flash rapidly, with the number of flashes indicating the type of fault. Faults can be displayed by the Programmer.

The installation and operational performance can be customized to the specific requirements of the user by using the DZ-DS Programmer.

The lock-on electrical connectors are designed to simplify the wiring harness and to provide vibration resistant contacts.

A rigid die-cast metal case gives long life protection to the electronics and seals against water splashes and the ingress of dust.

The DS100 and DS161 Controllers are protected against accidental reverse battery connection.

The DS100 and DS161 Controllers can be used with either a dual direction speed lever or a single direction speed lever and forward/reverse switch. If required, a high/low speed switch or maximum speed potentiometer can be fitted in line with the speed control lever.

For safety, the Controller will not operate if the speed input lever is not in the neutral position when the Controller is turned on. The speed input should be set to the neutral position and the Controller will then be able to operate normally.

If the system is turned on but not operated for a set period of time, the Controllers will automatically turn themselves off to conserve battery life. They can be turned on again by turning the ON/OFF switch “off” and then “on” again.

A reversing buzzer is provided for when the motor is driving in reverse. The volume of the reverse buzzer can be altered, or it can be turned off, using the Programmer.

The DS100 and DS161 Controllers provide the facility to use the built-in buzzer as a warning horn.

If required, the parking brakes and the motor brake may be disengaged without the motor driving. This allows the motor to revolve without the necessity for mechanical clutch releases. The Controller must be switched on for this function to operate. Do not move the scooter too fast (faster than it would normally drive).

In order to limit the Controller case temperature, the output current is reduced at high internal temperatures. In operation, the heating of the Controller is balanced by the cooling. Under over-load conditions, Controller temperature stabilizes at less than 70°C on the case.

In most cases it is desirable for the motor to run at a constant speed irrespective of battery voltage. The DS100 and DS161 control the motor voltage in this manner. Under these conditions the voltage at the motor terminals is limited to 24 Volts, even with freshly charged batteries.

The DS100 and DS161 control the power to the motor so as to limit drive at very high or very low battery voltages, thereby reducing battery damage and extending battery life.

3 INSTALLATION

Note : It is important to note that the DS100 and DS161 Controller connector pins should not be touched as contamination or serious internal damage caused by electrostatic discharges may result.

Electromagnetic Compatibility (EMC)

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

Emissions:	CISPR22, class B
Susceptibility:	IEC1000-4-3
ESD:	IEC1000-4-2

Compliance levels and set-up as per ISO 7176, part 21.

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

Minimising Emissions

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

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

Immunity to Radiated Fields

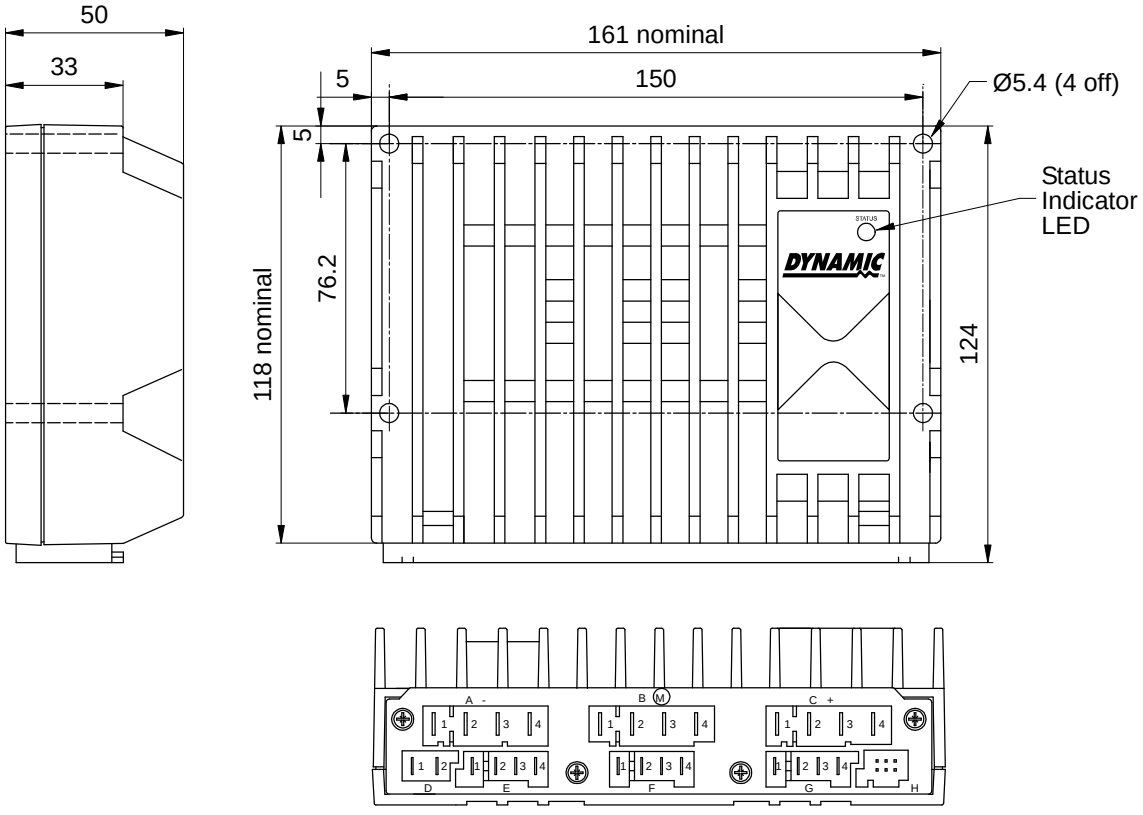
Follow the wiring recommendations for minimising emissions.

Immunity to ESD

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

Mechanical Installation

- The Controllers may be mounted on any type of structure but should be located in a position with unobstructed airflow over the cooling fins.
- The connectors should not be mounted facing vertically upwards unless they are protected from water splashes.
- Irrespective of mounting position, connectors must be protected from water splashes.
- 5mm or 3/16" machine screws are recommended fasteners.



Electrical Installation

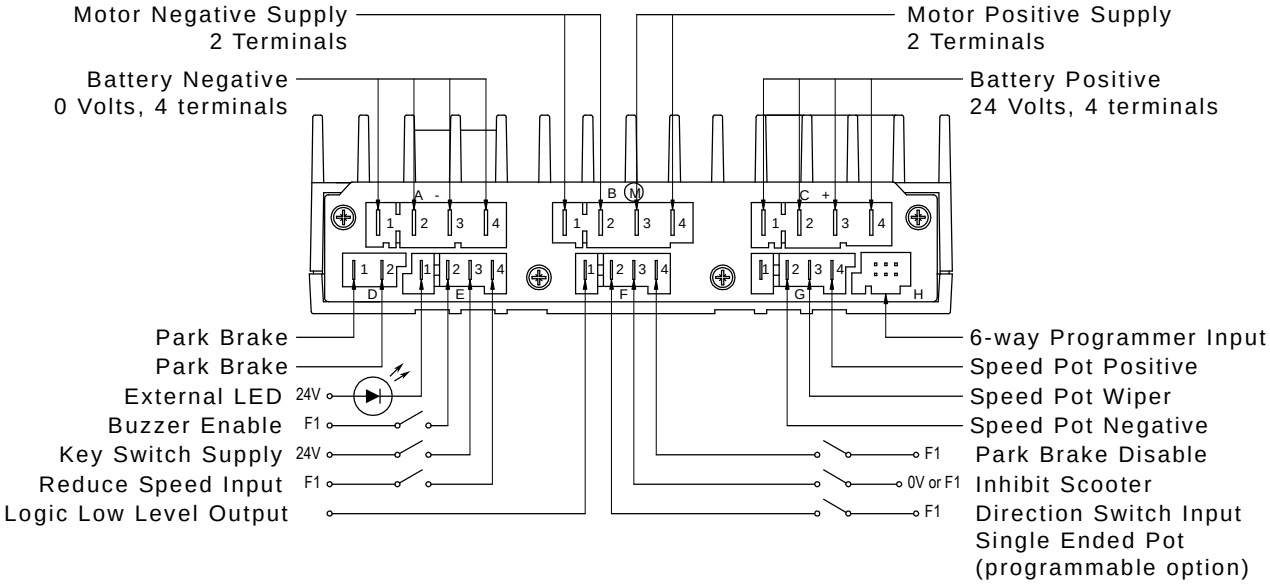
Note : 24 volts refers to battery positive.

The DS100 and DS161 Controllers are designed to perform optimally with either Lead-Acid or Gel Cell deep cycle batteries. Consult the manufacturer for other battery types. It is recommended that two 12 volt batteries with a greater capacity than 20 ampere hours be used.

All electrical connections are designed to be implemented using AMP Positive Lock (Mark II) connectors. See Wiring and Connector Guide.

All wiring is to be securely fastened to the frame to ensure that in normal use there will be no wire strain onto the Controller connectors.

Note : Elevate the drive wheels or disconnect the motor from the drive before making any connections to the DS100 or DS161 Controller.



Wiring and Connector Guide

Termination	Description	Wire Size (1)	AMP (JAPAN) Positive Lock MK II Receptacles		AMP (Japan) Positive Lock MK II Housing
			Loose	Strip	
A1	Battery Negative (2)	2.0mm² *	170334-1	170328-1	174429-1
A2	Battery Negative (2)	2.0mm² *	170334-1	170328-1	
A3	Battery Chgr Neg.	1.0mm² *	170334-1	170328-1	
A4	Unused	-	-	-	
B1	Motor Negative (2)	2.0mm² *	170334-1	170328-1	174429-1
B2	Motor Negative (2)	2.0mm² *	170334-1	170328-1	
B3	Motor Positive (2)	2.0mm² *	170334-1	170328-1	
B4	Motor Positive (2)	2.0mm² *	170334-1	170328-1	
C1	Battery Positive (2)	2.0mm² *	170334-1	170328-1	174429-1
C2	Battery Positive (2)	2.0mm² *	170334-1	170328-1	
C3	Battery Chgr Pos.	1.0mm²	170334-1	170328-1	
C4	Key Switch Supply	0.5mm²	170331-1	170325-1	
D1	Park Brake	1.0mm²	170331-1	170325-1	175578-1
D2	Park Brake	1.0mm²	170331-1	170325-1	
E1	External LED	0.5mm²	170330-1	170324-1	174513-1
E2	Buzzer	0.5mm²	170330-1	170324-1	
E3	Key Switch	0.5mm²	170330-1	170324-1	
E4	Reduce Speed	0.5mm²	170330-1	170324-1	
F1	Optional Ground	0.5mm²	170330-1	170324-1	174513-1
F2	Single-ended Rev.	0.5mm²	170330-1	170324-1	
F3	Inhibit	0.5mm²	170330-1	170324-1	
F4	Park Brake Disable	0.5mm²	170330-1	170324-1	
G1	Unused	-	-	-	174513-1
G2	Speed Negative	0.5mm²	170330-1	170324-1	
G3	Speed Pot Wiper	0.5mm²	170330-1	170324-1	
G4	Speed Positive	0.5mm²	170330-1	170324-1	

1 *2.0mm² is the minimum copper wire size that should be used. On wire sizes over 2.0mm² use loose piece receptacle P/No. 170335-1 or strip receptacle P/No. 170329-1.
For the DS161, a minimum wire size of 3.0mm² should be used.

2 Two Controller terminals must be used for each battery and motor connection to prevent connector contact overloading.

3 Contact AMP for crimping and connector notes.

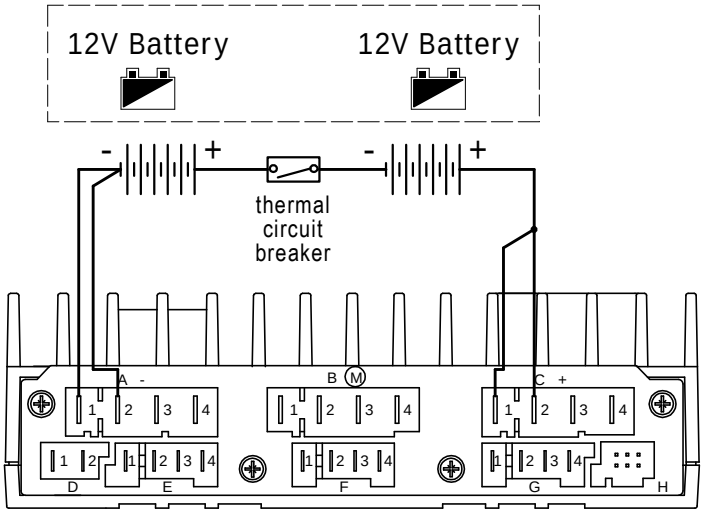
Required Controller Connections

Battery Connection

In order to prevent overloading the battery connector contacts, two terminals each for positive and negative connections to the batteries must be used. Connectors A1 and A2 are used for connecting to battery negative and connectors C1 and C2 are used for battery positive.

Ensure that a thermal circuit breaker is installed in the battery wiring to protect the batteries, wiring loom and Controller from external short circuits. The best position for this circuit breaker is between the two batteries as shown. Recommended circuit breaker ratings are; DS100 - 50 Amp
DS161 - 80 Amp

Note : For RFI susceptibility test (20V/m), some scooter systems may require screened looms or ferrites in order to increase their RFI immunity.



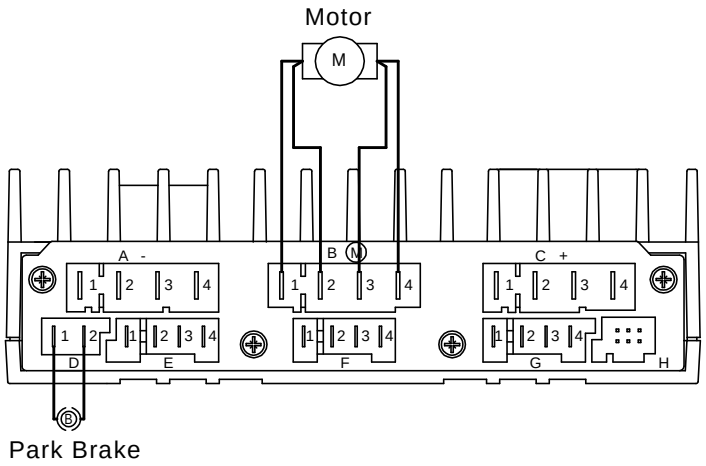
Motor Connection

In order to prevent overloading the motor connector contacts, two terminals each for positive and negative connections to the motors must be used. Connectors B1 and B2 are used for connecting to the motor negative and B3 and B4 are used for motor positive.

The battery operated park brake, if fitted, should be connected between pins D1 and D2.

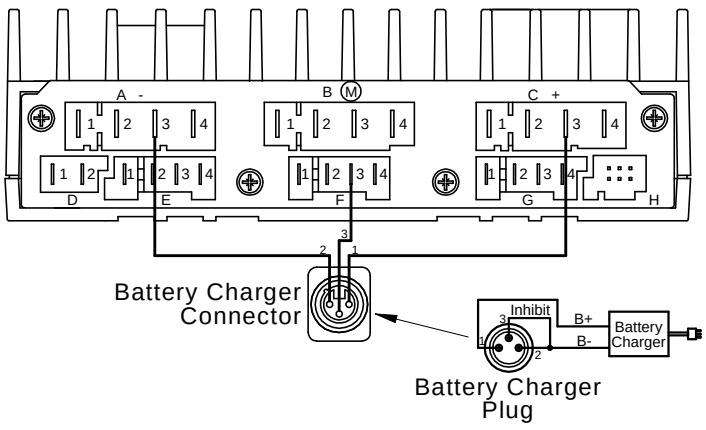
The DS100 EMC and the DS161 Controllers comply with Emissions requirements (CISPR 22, class B) but the Controllers might not control motor emissions. Use a screened motor loom, or ferrites or capacitors across the motor brushes in order to reduce the motor emissions if necessary.

Note : For RFI susceptibility test (20V/m), some scooter systems may require screened looms or ferrites in order to increase their RFI immunity.



Battery Charging Loom

For safety, the motor must be prevented from driving while the battery charger is plugged in. This is done by connecting battery negative to the Inhibit pin F3 using the battery charger plug and socket as shown.
Alternatively, where an onboard battery charger is used, a Battery Charge/Run switch should be used to connect the Inhibit pin F3 to battery negative during charging.

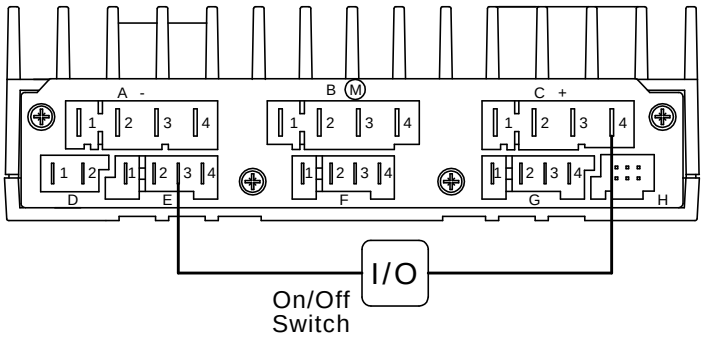


On/Off Switch

The ON/OFF switch should be wired as shown.

The switch life should be rated for at least 1 million cycles operation. It should be 24V and at least 10mA continuous DC. A fuse is not required.
The ON/OFF switch must be mounted in a position that is easily accessible to the user.

Note : Excessive switch contact bounce may not allow the Controller to power up properly.



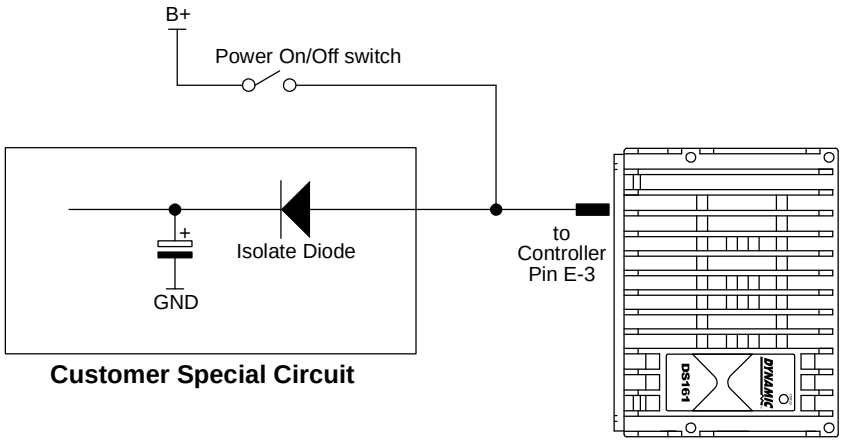
Key Switch

On non-EMC DS100 controllers (DS100xA) the Key Switch Input is for both power on signal input and for logic PCB power supply input. When the controller is ON there is approximately 100mA through E3, therefore E3 could handle a small external capacitive load, however noise can reach the logic PCB through E3 which is not good for RFI immunity.

On EMC DS100 (DS100xB) and DS161 controllers, the key switch is for monitoring the power switch only.

- High (E3 connected to B+) ý Power ON
- Low (E3 open circuit) ý Power OFF

When the controller is on there is approximately 0.8mA through E3, therefore RFI signals through E3 to the logic PCB are significantly reduced. If it is necessary to have a capacitive load on E3 (some customers may use this pin for an external power supply), a diode must be used to isolate between the capacitive load and the key switch input. See the figure overleaf.



Speed Input

Two types of potentiometer can be used for speed control.

The DS100 and DS161 are capable of using either:

- Standard (~270°) electrical travel or,
- Short (~45°) electrical travel potentiometers.

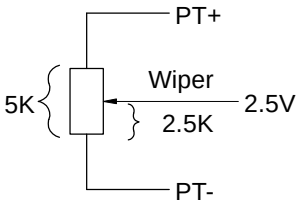
In either case resistance should be 5K ohms with linear resistance tapers. The desired option is selected using the Programmer. We recommend the use of a high quality long life (greater than 10M cycles) potentiometer. The use of carbon wire wound potentiometers is not recommended.

The Standard Speed Pot option uses a part of the pot travel only. During operation a Controller fault will occur if the pot shaft is rotated too far outside the given voltage ranges given below.

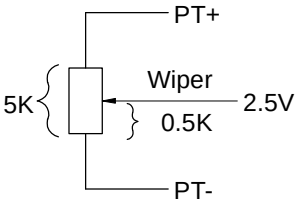
Programmer Setting		Voltage Required on Terminal G3 to get:		
Standard Speed Pot	**Single Ended Speed Pot**	**Full Speed Reverse**	**Zero Speed**	**Full Speed Forward**
ON	ON	N/A	2.5V	3.5V
OFF	ON	N/A	2.5V	4.3V
ON	OFF	1.5V	2.5V	3.5V
OFF	OFF	0.7V	2.5V	4.3V

The Wiper on neutral position is:

Short Travel Pot

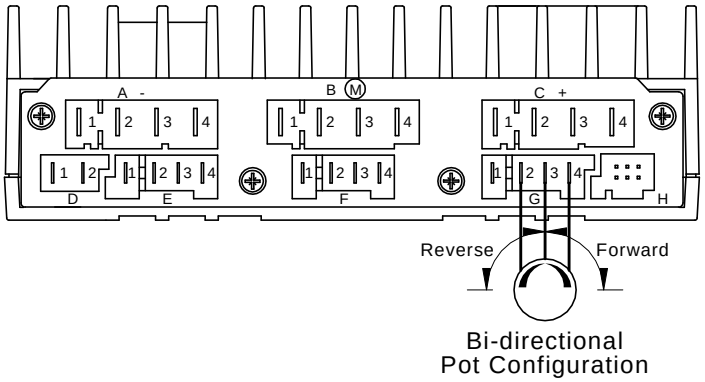


Standard Pot

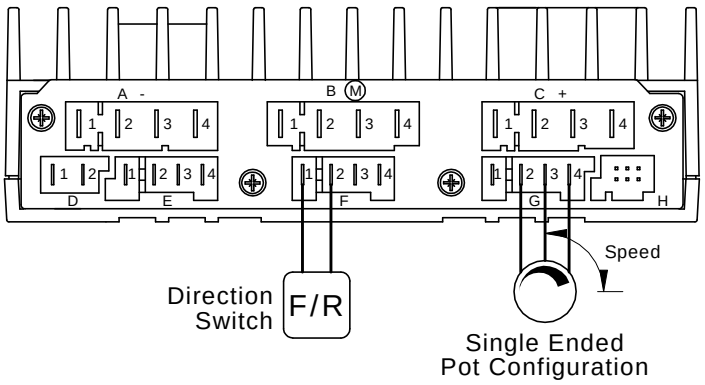


The speed input potentiometer may be used for speed control in both directions or alternatively in one direction with a separate forward/reverse switch. This option is also selected using the Programmer.

Note : In order to improve EMC, the speed pot body should have a good connection with the scooter chassis. Ensure also that all scooter sub-frames are electrically connected.



Bi-directional
Pot Configuration



Single Ended
Pot Configuration

Optional Controller Connections

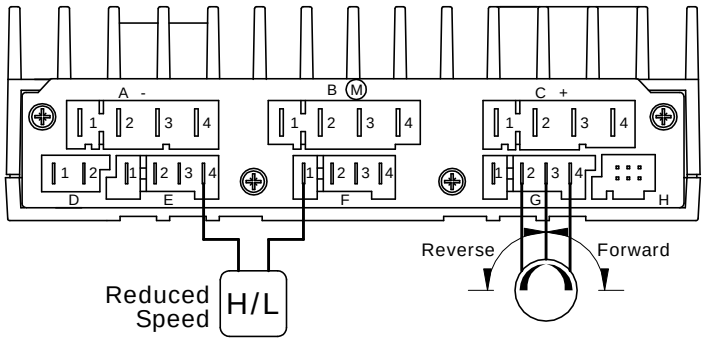
Logic Low Level Output

F-1 is a Logic Low Level Output Pin. Use this pin for all external control low level signal sources for good RFI immunity instead of using ground.

Pin F-1 is not battery ground. Do not use this pin for any power supply ground.

High/Low Speed Control

Scooter maximum speed in both forward and reverse can be limited by two alternative methods:



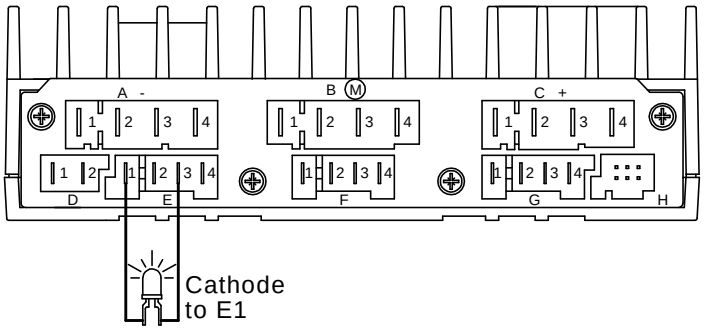
1. Terminal E4 can be switched to either terminal F1 or battery negative with an external switch as shown. When this is enabled with the Programmer, the Controller speed will be reduced whenever the switch is turned on.

2. A switched resistor or 25K to 50K ohms linear potentiometer in series with the Wiper line to terminal G3.

External LED

The Controller incorporates a Status Indicator light to show operation, voltage too low or too high, and fault conditions. See Flash Codes for further details. If the Controller is mounted in a position where the light cannot be seen easily, an external LED may be used.
The external LED does not require a resistor and should be wired directly from the ON/OFF switch supply to terminal E1. Its colour should be yellow.

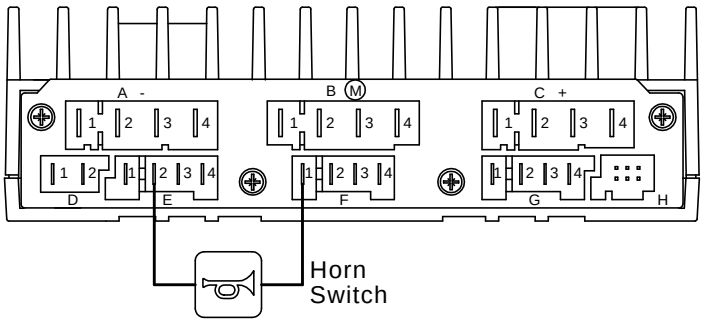
Note : LEDs rated for 12 or 24V etc. have internally fitted resistors. These LEDs are unsuitable.



Horn

For installations where the internal buzzer is used as a warning horn, the horn switch should be connected to terminals E2 and A4, or E2 and F1 or any other suitable battery negative point.

The buzzer volume is always maximum when activated by this switch. See Setup Menu for further details.



Controller Setup

The initial Controller setup procedure involves three main steps:

1. Electrical connections;
2. Speed Input conditioning;
3. Optimisation of settings (see Programming section).

Electrical Connections

Note : For safety reasons, ensure the battery supply is disconnected during wiring.

1. Ensure the following connections are made to the controller.
   - Battery Positive
   - Battery Negative
   - Motor Positive
   - Motor Negative
   - On/Off Switch
   - Electric Park Brake (if fitted)
   - Speed Input

   No other connections are necessary at this stage.

2. Disconnect the motor from its load or elevate the drive wheels to allow the motor to be run safely if it drives unexpectedly.

3. Switch the On/Off switch On and check the status indicator light.

   If the status indicator light is off, power is not being applied correctly to the controller. If the indicator is flashing, either count the number of flashes and refer to the Diagnostics and Fault Finding section, or, plug in the Programmer to identify the fault. Ignore any speed input faults at this stage.

4. If the indicator is on and steady, initial setup is completed. Switch off the power.

   If not, rectify any faults as the Controller prevents drive under most fault conditions.

Speed Input Conditioning

The DS100 and DS161 can be used with either a dual direction speed lever or a single direction speed input and a forward/reverse switch. Either option may be used with a standard speed pot or some alternative speed input. One of these options will be selected as the default setting. These options should be checked to ensure they are correctly set. Once Speed Input Conditioning is completed, see the Programming section for setting the Speed Lever in Neutral.

To use a Single Direction Speed Lever (single-ended pot)

1. Switch the On/Off switch On and ensure that the status indicator light is on (or flashing).

2. Plug in the programmer and wait for it to move through its fault diagnosis routine.

3. Press the MENU button until the display reads : 'Press ENTER to go to Options Menu'.

4. Press ENTER. The display will read 'Single-Ended Pot : ON' (or OFF).

5. Press the VARY button to ensure that it reads On.

6. Press the ENTER button to ensure the setting is saved.

7. Unplug the programmer to transfer the information into the Controller memory.

   Wait 2 seconds before switching off the Controller. The Controller's Status Indicator light will light when the transfer of information has been completed.

To use a Dual Direction Speed Lever

Carry out steps 1 - 4 for the Single Direction Speed Lever.

5. Use the VARY button to ensure the display reads 'Single-Ended Pot : OFF'

6. Press the ENTER button to ensure the setting is saved.

7. Unplug the programmer to transfer the information into the Controller memory.

   Wait 2 seconds before switching off the Controller. The Controller's Status Indicator light will light when the transfer of information has been completed.

To use a Standard Travel Speed Input pot

Carry out steps 1 - 4 for the Single Direction Speed Lever.

5. Press the NEXT button until the display shows 'Standard Speed Pot : ON' (or OFF).

6. Use VARY button to ensure the display reads 'Standard Speed Pot : ON'.

7. Press the ENTER button to ensure the setting is saved.

8. Unplug the programmer to transfer the information into the Controller memory.

   Wait 2 seconds before switching off the Controller. The Controller's Status Indicator light will light when the transfer of information has been completed.

To use a Short Travel Speed Input Pot

Carry out steps 1 - 4 for the Single Direction Speed Lever.

5. Press the NEXT button until the display shows 'Standard Speed Pot : ON' (or OFF).

6. Use VARY button to ensure the display reads 'Standard Speed Pot : OFF'.

7. Press the ENTER button to ensure the setting is saved.

8. Unplug the programmer to transfer the information into the Controller memory.

   Wait 2 seconds before switching off the Controller. The Controller's Status Indicator light will light when the transfer of information has been completed.

4 PROGRAMMING

DZ-DS Programmer

The DZ-DS Programmer is designed to enable effective installation of the DS100 and DS161 Controllers. By using the Programmer, the Controller can be adjusted to suit a particular application and the driving performance can be regulated to suit each individual's requirements. A simplified DZ-DS Programmer is also available for purchase by users.

The DS100 and DS161 have default settings pre-programmed during manufacturer. Once the speed input information has been programmed correctly, the default settings will allow the Controller to operate. However, the default settings may need to be changed to suit a particular user or design of vehicle.

Warning : When a setting has been modified, the installation must be checked for safety for each particular user.

If a wheelchair is programmed with settings other than default, under some very rare fault conditions default settings could be automatically restored, thereby changing driving characteristics. This in turn could lead to a chair moving in a direction or speed that is not intended. Programmers should consider this risk when programming settings that differ from default settings.

The Programmer is inserted into the DS Controller by plugging the plug into connector H on the Controller bulkhead. No external power supply is required by the programmer as it is fully powered by the Controller.

Warning : Do not plug the Programmer into the Controller while the vehicle is in motion.

Note : The vehicle cannot be operated while the Programmer is plugged into the Controller.

Programmer Operation

Warning : Disconnect the motor from its load or elevate the drive wheels to allow the motor to be run safely if it drives unexpectedly.

Plug the Programmer into socket H on the Controller, with power switched on to the Controller.

In the unlikely event that a fault has occurred, a brief description of the fault will be displayed on the Programmer initially and the Fault Menu will be accessible.

There are six menu options on the manufacturer's Installation Programmer:

- Fault Menu - only available if a fault exists
- Setup Menu
- Options Menu
- Profiles Menu
- Speed Lever in Neutral Menu
- Controller Version Menu

The Setup Menu and the Options Menu are most frequently used for examining and individually changing the Controller characteristics. Profiles and Speed Lever in Neutral Menus are for use by experienced users only.

There is one menu option on the "User" Performance Programmer: The settings that can be modified by the "User" Programmer are marked by a (*).

Modifying Features

To alter any Menu options:

1 Switch the on/off switch of the Controller ON and check that the Status Indicator light is on, or flashing.

2 Plug in the Programmer.

3 Press the MENU button until the desired menu is displayed. Press ENTER.

4 Press the NEXT button to cycle through the parameters. The value will be displayed.

5 Press the VARY Button to change the setting.

6 Press ENTER to store the setting. Repeat steps 5 to 7 for each parameter to be modified.

7 Unplug the Programmer to transfer the information into the Controller memory.

8 Wait two seconds before switching the Controller off. The Status Indicator will light when data transfer has been completed.

Note : If the controller power is turned off before unplugging the programmer, any changes made will not be transferred to the controller.

Fault Menu

The Fault Menu is automatically displayed if there is a fault when the Programmer is plugged in. All faults, including internal faults are displayed in plain text. See Flash Codes for fault descriptions and their associated Status Indicator light flash code.

Setup Menu

This menu allows the operator to examine the existing Controller settings and to change the settings stored in the Controller giving the user the ability to tailor the system to their individual requirements. These must always be checked for safe operation.

Note : If the controller power is turned off before unplugging the programmer, any changes made will not be transferred to the controller.

The following parameters are programmable through the Setup Menu by the DZ-DS Programmer. A limited version of the Programmer for use by the end user is available. These User Programmers can only adjust settings marked with a (*). Some parameters may not be available on earlier versions of controllers or programmers.

Acceleration (*): This function sets the maximum acceleration of the motor when it is not in current limit. The lower the number, the slower the acceleration. A lower acceleration may be used to give the motor softer performance or to compensate for speed input jittering.

Deceleration (*): This controls the time required to slow to a stop when the speed input requests zero speed. Normally a higher number is used for Deceleration than for Acceleration. Low numbers are not used except with very low Forward Speed values. Consider the safety of the operator.

Forward Speed (*): The maximum forward speed of the motor may be set using this function. This is commonly set to the maximum 10. High numbers give high speed. Consider the safety of the operator.

Reverse Speed (*): This sets the maximum reverse speed. As with Forward Speed, high numbers give high speeds. Reverse Speed is usually set equal to or less than Forward Speed.

Reduce Speed (*): This option may be used to reduce the drive speed in both forwards and reverse. Reduce Speed is enabled by switching terminal E4 to F1 (or some other battery negative point).

If terminal E4 is left unconnected, the speeds are always as set by Forward and Reverse Speeds.
When terminal E4 is switched to battery negative, the maximum speed in forwards corresponds to the lower of the settings for Forward Speed and Reduce Speed. In reverse it corresponds to the lower of the settings for Reverse Speed and Reduce Speed.

Buzzer Vol. (*): The value of this parameter sets the volume of the internal reversing buzzer. A setting of 1 is buzzer off. The higher the number the louder the sound. The buzzer volume is always maximum when activated by the external horn switch, terminal E2.

Motor Resistance: The Controller has inbuilt Load Compensation to maintain constant speed even with varying motor loads. The Motor Resistance value is used by the Controller to calculate required load compensation at any given time.

Begin by setting to a low value (50) and working the value upwards 10 at a time until the motor does not slow appreciably when loaded, at less than half speed. During this test, Acceleration and Deceleration should both be set to low values, e.g. 3 and 7 respectively.

When the Motor Resistance is set too high, performance is excessively harsh no matter what the Acceleration and Deceleration rates. When set too low, the motor speed decreases under a load. The effect is subtle and may change slightly as the motor heats up.

Once the preferred motor resistance setting is found, the Acceleration and Deceleration rates can be increased to suitable levels.

Contact your Service Agent if you experience problems in setting this value.

Sleep Time (*): This number is the maximum time in minutes that the Controller can be on in neutral before it goes into its low power “sleep mode”. The Controller beeps three times at maximum volume just before it goes to sleep. In the sleep condition, the Controller does not respond to any inputs, the Status Indicator is off, and the external LED is off. The power switch must be turned off and then on again to restart from sleep.

Maximum Current: The maximum motor current in amps is set with the Maximum Current value. This value should not be set at more than 105 for the DS100, or 80 for the DS161. The setting for the DS161 is internally corrected to a value of twice the programmed setting (e.g. a setting of 70 would produce a maximum current of 140 Amps).

Although the DS100 will provide 100A and the DS161 will provide 160A, the motor and looms may be damaged by continued conduction at this current. Increasing maximum current increases motor power and motor temperature, and decreases the time between battery recharges. In some cases the motor heating is extremely severe at a maximum value and significantly longer motor life is obtained by setting current limit below this maximum.

If maximum current is set too low, the motor may not have the power to accelerate the vehicle properly and the acceleration (and deceleration) time will be increased. The correct value of maximum current is a compromise between motor and wiring heating, battery life and motor power.

Park Brake Delay: The time from when the motor stops to when the park brake comes on is set by the Park Brake Delay value.
A low value is used to minimize creep when the motor stops under a load. If in the case of an electric scooter, the stopping load varies, this setting will be a compromise between that required when stopping on a smooth floor and stopping on a slope.
Inappropriate settings will cause excessive jerking.

Options Menu

Note : If the controller power is turned off before unplugging the programmer, any changes made will not be transferred to the controller.

The following parameters are programmable through the Options Menu by the DZ-DS Programmer. A limited version of the Programmer for use by the end user is available. These parameters cannot be set by the user.

Single-ended Pot: In situations where speed control in only one direction is required or where a separate switch is used for direction control, this function should be turned ON.
Where the speed and direction are controlled with one lever, the speed input is termed dual direction and the single-ended Pot function should be turned OFF.

Standard Speed Pot:
This function may be turned ON or OFF with the Programmer. It allows the use of readily available potentiometers in situations where operation over a restricted part of the full rotation is desired. When ON, 15V is applied across the pot terminals. This is not necessary for potentiometers with a shortened electrical travel and may be unsuitable for electronic inputs. Use the OFF setting for all speed inputs except standard (~ 270° electrical travel) potentiometers.

Motor Reverse: This is a way of compensating for a reversed motor polarity connection. If the motor goes in the opposite direction to that desired, change this option setting.

Pot Reverse: With Pot Reverse OFF input voltages higher than neutral give forward speed and input voltages lower than neutral give reverse speed.

Setting Pot Reverse ON can be used to compensate for a reversed pot polarity connection. It reverses the above input voltage requirements.

Brake Checking: This option allows operation of the Controller using motors without park brakes.

If the motor has an electric park brake, turn this option ON.

Load Compensation:

In normal operation Load Compensation should be ON. When initially setting the Controller's performance parameters however, it may be advantageous to turn Load Compensation OFF as harsh or aggressive performance results from over compensation. This option turns on the Motor Resistance function in the Setup Menu.

Enable Sleep: As previously described, the Controllers have a Sleep Mode to conserve battery power. This mode is normally set ON which enables the Sleep Mode to operate. However, the Sleep Mode facility can be turned OFF using this option.

Check for Slope: Should normally be set OFF.

This option can be set ON to bypass the Park Brake Delay when on a steep slope. However this can cause a jerk when coming to a stop on the flat unless the Deceleration rate is set to a low value.

Current Limit: When this is turned ON the Controller will only allow operation at Current Limit for 15 seconds. It will then reduce to zero Current output and fault with Fault Code 4.

Warning : This option should be set ON in any situation where a person's safety may be at risk as a result of continuous Controller Current Limit outputs.

Profiles Menu

Profiles are a saved set of programmed parameters which enable different configurations to be easily loaded depending on the driving conditions. For example, these could be an indoors profile, an outdoors profile and a sports profile. A maximum of five profiles can be stored in the Programmer. Profiles are primarily for use by manufacturers and servicing agents to allow a number of Controllers to be simply programmed with custom performance settings depending on their customer's needs.

Profiles should only be used once experience is gained in using the Setup and Options menus.

To Edit Profiles

1. In the main menu screen use the MENU button to scroll to the Profiles Menu. Press ENTER.

2. Press NEXT to proceed to Edit Profiles. Press ENTER.
   This will enable the programming of up to five customer Profiles.

   The display will read: "Store as Profile # : 1" or (1 to 5)

3. Choose a Profile # (Number) by pressing VARY. Press ENTER.

4. Work through the profile, altering parameters to suit individual requirements. Press ENTER after each value is changed.

5. Once all Settings and Options have been modified to requirements, press the MENU button. To store all the Settings and Options in the Profile, press ENTER in the chosen Profile Number.

6. Press MENU to return to the Profile Menu.

7. Repeat this process as required for the other four Profiles.

Upload Profile from Controller to Programmer

1. In the main menu screen use the MENU button to scroll to the Profiles Menu. Press ENTER.

2. Press NEXT to proceed to Upload Profile. Press ENTER.

   The display will read: "Store as Profile # : 1" or (1 to 5)

3. Use the VARY key to choose the Profile that it is to be stored into and then press ENTER.

Download Profile from Programmer to Controller

1. In the main menu screen use the MENU button to scroll to the Profiles Menu. Press ENTER.

2. Press NEXT to proceed to Download Profile. Press ENTER.

3. Choose either a Profile Number (1 to 5) or the Default profile. Press ENTER to download it to the Controller.

4. After downloading, the Programmer will automatically enter the Check Profile menu (later version Programmers). Press the NEXT button to step through the settings. Ensure the required profile has been downloaded. Press the MENU button when finished.

5. The Programmer will then automatically enter the Speed Lever in Neutral Menu. See Speed Lever in Neutral Menu for further details. This can be exited using the MENU button.

Note : If the Programmer is removed while in the Download Profile Menu screen and then plugged into another Controller, it will return to that same screen. The Programmer will be ready to download that same Profile.

6. To prevent inadvertently changing the profile, a Lock function is available, so that only authorised people can have access to the profile.

   When "Press ENTER to Download Profile" appears, the Lock function is available to be implemented. To activate the Lock, hold down Button 2 whilst pressing the code.

   By then releasing Button 2 it locks the profile and only the download function is available.

   Repeat the sequence to unlock.

7. Unplug the Programmer to transfer the information into the Controller memory. Wait 2 seconds before switching off the Controller itself. The Status Indicator will light when the transfer into its memory has been completed.

Note : If the controller power is turned off before unplugging the programmer, any changes made will not be transferred to the controller.

Speed Lever in Neutral Menu

When using a potentiometer to control the motor speed, it is usual to spring load the shaft so that it returns automatically to neutral. This is a mechanical neutral only. The pot position must be adjusted so that the Controller sees a voltage corresponding to zero speed when the pot is returned to neutral by the spring.

There is some dead band around this electrical zero speed. This is to allow for wear in the spring mechanism and to make the pot easier to centre. The default setting for zero speed is 2.5V on the Controller terminal G3.

The Pot can be centred using the DZ-DS Programmer as follows:

1. Plug in Programmer.

2. In the main menu screen use the MENU button to scroll to the Speed Lever in Neutral Menu. Press ENTER.

   The display will read: "Buzzer Will Sound When Lever Centred".

3. Adjust the pot until the buzzer sounds.

4. Lock the pot spindle in this position using the grub-screw.

Note : The Speed Lever in Neutral Menu is automatically entered after downloading a Profile.

Controller Version Menu

1 In the main menu screen use the MENU button to scroll to Controller Version Menu. Press ENTER.

The display will give details of the Controller version.

5 DIAGNOSTICS AND FAULT FINDING

Diagnostics can be examined from two platforms: from the Flash Codes signalled with the Status Indicator; and from the DZ-DS Programmer.

Flash Codes

Any fault condition on the Controller will cause the Controller's Status Indicator to flash. Flashing occurs in bursts of flashing separated by a two-second pause. The number of flashes in each burst is referred to as the Flash Code and indicates the nature of the fault. The title of the flash code is also displayed by the Programmer if connected to the faulty system.
Faults that would affect the safety of the user will cause the system to stop while less critical ones will be indicated but allow the chair to continue driving. Some faults will automatically clear if the fault is removed, in which case the Status Indicator will become steady and the system will operate as normal. Other faults are latched and must be cleared by turning the system off, waiting for two seconds, and then turning it back on again.

DS Status Indicator Flash Code	Fault Description	Impact on Controller	Notes
1	Battery needs recharging	Reduced drive is available.	The battery voltage has dropped below 23.3 volts in neutral. Recharge batteries.
2	Battery voltage too low	Drive inhibited.	The battery charge has dropped past 16.5 volts and is not sufficient to allow safe driving. Check the battery condition and the connections.
3	Battery voltage too high	Drive inhibited. If the scooter is travelling, a soft stop occurs.	The battery charge has exceeded 32 volts. Check the battery condition and the connections.
4	Current limit time out	Drive inhibited.	The motor current has reached too high a value. Check the condition of motor and loom(s). Contact your Service Agent.
5	Park Brake fault	Drive inhibited.	Check park brake connections. Check the condition of motor and loom(s). Contact your Service Agent.

DS Status Indicator Flash Code	Fault Description	Impact on Controller	Notes
6	Speed control out of neutral	Drive inhibited.	Return speed pot to neutral and reset system. Readjust the speed lever neutral if necessary. Contact your Service Agent.
7	Speed control fault	Drive inhibited.	Check speed pot wiring for open or short circuits. Check speed pot set-up. Contact your Service Agent.
8	Motor fault	Drive inhibited.	Contact your Service Agent.
9	Internal (Controller) fault	Drive inhibited.	Contact your Service Agent.

Reduced Drive

If the Controller detects a fault condition that does not critically affect the safety of the user or the integrity of the DS System, it will revert to a reduced speed mode which recognises problems but allows the user to limp home where the problem can be assessed.

Fault Solutions

The following steps should be taken if a DS System does not operate. They will help identify whether the problem is with the Controller or some other part of the System. See Electrical Installation for further details.

Apparatus Required: Voltmeter

Action: Turn ON/OFF Switch on.

If the Status Indicator on the Controller is Off....

Check: Confirm that the battery supply voltage is present on the Controller terminals.

1 Connect the voltmeter negative probe to any of terminal A1-4 on the Controller bulkhead.

2 Connect the voltmeter positive probe to any of terminal C1-4 on the Controller bulkhead.

Result: The voltmeter should measure 23-27 volts (i.e. Battery Voltage).

If the voltage is negative check for correct battery wiring polarity.

1 Ensure that batteries are connected correctly. See Electrical Installation for further details.

If 0 volts check for wiring open circuits or the circuit breaker.

1 Leave the negative voltmeter probe on the A-Controller Terminal and put the positive probe on the ON/OFF Switch Input Terminal E3.

Result: The voltage should measure 23-27 volts (i.e. Battery voltage).

Check: Confirm that the Programmer is not plugged in.

1 Check that the Programmer is not plugged into connector H on the Controller bulkhead.

Action: If these are correct but the light is still not on, contact your Service Agent.

If the Status Indicator is Flashing...

Check: Count the Flash Code or use the Programmer to determine the cause of the fault. See Flash Codes to assist with the correct diagnosis.

If the Status Indicator is permanently On:

Note : Before carrying out the following tests, ensure the motor can operate freely without the vehicle moving (e.g. by disconnecting the drive or raising the drive wheels off the ground).

Check: Check the voltages on the Controller Speed Potentiometer Terminals with the speed lever in neutral.

1 Connect the negative voltmeter probe on the A- Controller Terminal and put the positive probe on each of the Speed Potentiometer terminals (G2, 3 and 4).

Result: The voltage should measure:

Short Travel Pot	G2	0.45 ± 0.1volts
(Standard Pot Off)	G3	2.50 ± 0.5 volts
	G4	4.55 ± 0.1volts
Long travel Pot	G2	1.25 ± 0.1 volts
(Standard Pot On)	G3	2.50 ± 0.2 volts
	G4	13.56 ± 0.1 volts

2 Move the Speed Lever in Forward and Reverse directions while leaving the voltmeter probes connected to terminal G3.

Result: The voltage on Terminal G3 should increase/decrease by at least 0.5 volts.

If not check for wiring open circuits or else the potentiometer itself.

1 Ensure that potentiometer is connected correctly. See Electrical Installation for further details.

Check: Check the Motor Terminals B1 and B4.

1 Measure the voltage with the voltmeter probes placed on terminals B1 and B4.

Result: The voltage measured should be 0 volts in Neutral, and at least 10 volts (and up to 24 volts) at full speed.

If the voltage out of neutral is above 0 volts yet the motor is not running - check wiring or motor.

Ensure that motors are connected correctly. See Electrical Installation for further details.

Check: Check the Park brake Terminals D1 and D2.

1 Measure the voltage with the voltmeter probes placed on terminals D1 and D2.

Result: The voltage across these should be approximately 0.5 volts in Neutral and 24 volts when the Speed Lever is out of Neutral.

Check: Check the voltages on the Inhibit Terminal F3.

1 Connect the negative voltmeter probe on the A- Controller Terminal and put the positive probe on the Inhibit Terminal F3.

Result: The voltage should measure 5 volts.

If it is 0 volts, check any inhibit switches are not engaged (eg from a battery charger socket). If 0 volts is applied to this terminal, drive will be inhibited.

Check: Check the Free Wheel Mode (Park Brake Release) Terminal F4 if applicable.

1 Connect the negative voltmeter probe on the A- Controller Terminal and put the positive probe on the Free Wheel Mode Terminal F4.

Result: The voltage should measure 5 volts. When switched to 0 volts, it will release the Park brake and stop drive.

If the Controller consistently fails any one of these tests, either exchange it with another working Controller or contact a Service Agent for further advice.

If the Controller passes tests, then the Fault is likely to be with some other part of the System and not with the Controller.

6 MAINTENANCE

1. All connections to the Controller should be regularly checked for integrity. Loose, damaged or corroded connectors or terminals, or damaged cabling should be replaced.

2. All switchable functions to the Controller should be regularly tested to ensure they function correctly.

3. The Controller should be kept free of dust, dirt and liquids. If necessary, wipe with a cloth dampened with warm water or alcohol. **Do not** use solvents or abrasive cleaners.

4. Where any doubt exists, consult your nearest Service Centre or Agent.

5. There are no user-serviceable parts within the Controller - do not attempt to open the case.

Warning : If the Controller or Programmer 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.

7 SAFETY AND MISUSE WARNINGS

Do not install, maintain or operate this equipment without reading, understanding and following the proper instructions and manuals, otherwise injury or damage could result.

The completed installation must be thoroughly checked and all programmable options must be correctly adjusted for safe operation prior to use.

A warning must be conveyed to the wheelchair operator that the Controller could cause the chair to come to a sudden stop. In situations where this may affect the safety of the user, this will require the fitting and wearing of a seat belt.

The DS Controller is fully programmable to optimise performance and safety. Do not operate unless you have full control. Ensure that the Controller is correctly programmed for your needs and environment and ask your dealer to adjust if necessary. Always choose a Profile that is safe with and that is compatible with the environment and user.

Performance adjustments should only be made by professionals of the health care field or persons fully conversant with this process and the drivers capabilities. Incorrect settings could cause injury to the driver, bystanders, damage to the chair and surrounding property.

After the wheelchair has been set up, check to make sure that the wheelchair performs to the specifications entered in the programming procedure. If the wheelchair does not perform to specifications, turn the wheelchair off immediately and re-program. Repeat procedure until the wheelchair performs to specifications.

Do not operate the Controller if it behaves erratically, or shows abnormal response, heating, smoke or arcing. Turn the system off, disconnect the battery or open the battery overload switch, and consult your Service Agent.

Do not operate the Controller if the battery is nearly flat as a dangerous situation may result due to loss of power in an inopportune place.

Do not attempt to operate the controller if a battery charger is plugged in.

Ensure the Controller is turned off when not in use.

No connector pins should be touched, as contamination or damage due to electrostatic discharge may result.

In the event of a fault indicator flashing while driving, the user must ensure that the system is behaving normally. If not, the system must be turned off and a service agent called immediately.

Most electronic equipment is influenced by Radio Frequency Interference (RFI). Caution should be exercised with regard to the use of portable communications equipment in the area around such equipment. While the manufacturer has made every effort to ensure that RFI does not cause problems, very strong signals could still cause a problem. If RFI causes erratic behaviour, shut the wheelchair off immediately. Leave off while transmission is in progress.

Report any malfunctions immediately to your Service Agent.

Disclaimer

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

ISO7176 - 9	Climatic Tests for Electric Wheelchairs
ISO7176 - 14	Power and Control Systems for Electric Wheelchairs
ISO7176 - 21	Requirements and Test Methods for Electromagnetic Compatibility of Electric Powered Wheelchairs and Scooters

However the performance of controllers fitted to wheelchairs and scooters is very dependant on the design of the wheelchair or scooter. Final compliance must be obtained by the vehicle manufacturer for their particular vehicle. No component certificate issued by Dynamic Controls Ltd. relieves a wheelchair or scooter manufacturer from compliance testing their particular vehicle.

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

8 WARRANTY

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

The Warranty is subject to the provisions that the equipment:

- Has been correctly installed.
- Has been used solely in accordance with this manual.
- Has been properly connected to a suitable power supply in accordance with this manual.
- Has not been subjected to misuse or accident, or been modified or repaired by any person other than someone authorised by Dynamic Controls Ltd.
- Has been used solely for the driving of electrically powered wheelchairs in accordance with the wheelchair manufacturer's recommendations.

9 SALES AND SERVICE INFORMATION

For Sales and Service advice, or in case of any difficulty, please contact:

Head Office

Dynamic Controls Limited
Print Place
Christchurch
New Zealand

Telephone: Int. 64 3 338 0016
Fax: Int. 64 3 338 3283

Australia

Electronic Mobile Service (EMS)
46 Berripa Close
North Ryde, Sydney
NSW Australia 2113

Tel 24 hours: Int. 61 2 9887 2824
Pager: Int. 61 2 9963 1778
Fax: Int. 61 2 9887 2114

North America

Rosstron Inc
1521 W. 259th St
Harbor City, CA 90710
USA

Telephone: Int. 1 310 539 6293
Fax: Int. 1 310 539 4078

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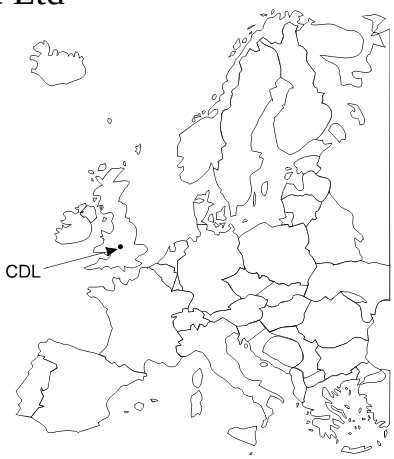
Controls Dynamic Ltd
Lisle Avenue
Kidderminster
DY11 7DL.
United Kingdom



Telephone Int. 44 1562 820 055
Fax: Int. 44 1562 742 720

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

10 ANHANG

Mindestempfehlungen für das Bedienungshandbuch und Vorsichtsmaßnahmen für die deutschsprachige Ausgabe.

Allgemeines

Die Steuereinheit beinhaltet empfindliche elektronische Schaltkreise. Jedweder Versuch sich Zugang zu der Elektronik zu verschaffen oder die Steuereinheit in irgendeiner Weise zu verändern macht die Garantie ungültig.

Beschreibung

Der eingebaute Mikroprozessor überwacht das Steuersystem ununterbrochen, um eine sichere und zuverlässige Arbeisweise zu garantieren.

Wenn die Batteriespannung zu niedrig ist blinkt die Status Leuchtdiode langsam als Warnsignal, um auf die notwendige Wiederaufladung der Batterien hinzuweisen. Wenn die Steuereinheit einen Defekt feststellt, dann blinkt die Leuchtdiode schneller und die Anzahl der Blinkzeichen weist auf die Fehlerursache hin. Ein Defekt kann auch durch die Programmier-Einheit angezeigt werden.

Die Installation und Arbeitsweise der Steuereinheit kann mit Hilfe der DZ-DS Programmier-Einheit auf die spezifischen Gegebenheiten angepasst werden.

Wenn die Steuereinheit eingeschaltet wird, während der Geschwindigkeitsregler sich nicht in der neutralen Position befindet, dann funktioniert die Einheit nicht. Der Geschwindigkeitsregler sollte sich in der neutralen Position befinden damit die Steuereinheit normal arbeitet.

Der DS100/DS161 schaltet sich automatisch ab, wenn das Gerät (nach dem Einschalten) für eine bestimmte Weile nicht benutzt wird, um die Batterien zu schonen. Die Einheit kann wider eingeschaltet werden, indem der Ein/Aus (ON/OFF) Schalter aus- und dann wieder eingeschaltet wird.

Ein Rückfahrt-Warnsignal steht zur Verfügung wenn sich der Motor im Rückwärtsgang befindet. Die Lautstärke kann, mit Hilfe der Programmier-Einheit verändert oder ganz abgestellt werden.

Elektrische Verbindungen; Bitte beachten Sie

Die Messerkontakte der DS100/DS161 dürfen nicht berührt werden, um elektrostatische Beschädigungen zu vermeiden.

Die Messerkontakte klicken wenn sie sich mit den Kontaktbuchsen verbinden. Zum Herausziehen der Verbindungen bitte nur an den Plastikbuchsen anfassen, weil Kabelverbindungen eingerastet sind.

Batterie-Aufladung

Solange das Batterie-Ladegerät angeschlossen ist wird die Aussteuerung des Motors aus Sicherheitsgründen verhindert. Bitte benutzen Sie nur das mitgelieferte Ladegerät.

Zustand-Anzeige (Leuchtdiode)

Die Steuereinheit beinhaltet eine Zustandsanzeige um die Einsatzbereitschaft, den Ladezustand der Batterie oder eine Störung anzuzeigen. (Bitte beachten Sie die folgende Störungs-Übersicht).

Die Programmier-Einheit

Die auf Wunsch erhältliche Programmier-Einheit hat ein einfaches SETUP MENU (Auswahlsystem). Damit kann man die Einstellwerte den individuellen Vorzügen anpassen. Die Einstellwerte müssen immer eine sichere Bedienung gewährleisten. Weitere Einzelheiten sind von einem der Vertragshändler erhältlich.

Bitte beachten Sie, daß die neu programmierten Daten nicht gespeichert werden wenn die Steuereinheit während des programmierens abgeschaltet wird. In diesem Fall bleiben die alten Werte erhalten.

Warnung : Schließen Sie die Programmier-Einheit auf keinen Fall an die Steuereinheit an, während sich das Fahrzeug in Bewegung befindet. Solange die Programmier-Einheit an die Steuereinheit angeschloßen ist kann das Fahrzeug nicht bedient werden.

Bedienung der Programmier-Einheit

Bitte schalten Sie die Steuereinheit ein und verbinden Sie die Programmier-Einheit mit der Buchse ‘H' an der Steuereinheit. Im aussergewöhnlichen Falle einer Störung wird eine kurze Beschreibung des Fehlers auf der Programmier-Einheit sichtbar. (Bitte beachten Sie die Störungs-Übersicht).

Einstellungen - Das Auswahlsystem

Wenn die Programmier-Einheit keine Störung feststellen kann, dann beginnt sie automatisch mit dem Auswahl-Menu. Damit kann man die gegenwärtigen Daten in der Steuereinheit betrachten, und sofern erforderlich, abändern.

Störungs-Übersicht

Störkode, Anzahl von Blinkzeichen	Störungsanzeige	Steuereinheit Zustand	Bemerkung
1	Battery needs recharging	Benutzung des Fahrzeuga möglich	Die Batteriespannung ist unter 23.3 Volt im Leerlauf. Die Batterien sollten bald wieder aufgeladen werden.
2	Battery voltage too low	Antrieb unterdrückt	Die Batteriespannung an der Steuereinheit ist auf 16.5 Volt gefallen. Bitte überprüfen Sie den Zustand der Batterie und die elektrischen Verbindungen.
3	Battery voltage too high	Antrieb unterdrückt	Die Batteriespannung an der Steuereinheit ist höher als 32 Volt. Bitte überprüfen Sie den Zustand der Batterie und die elektrischen Verbindungen. Verdacht einer Ladegerät Störung.
4	Current limit time out	Antrieb unterdrückt	Die Steuereinheit hat einen Kurzschluß im Motor festgestellt. Bitte wenden Sie sich an Ihren Vertragshändler.

Störkode, Anzahl von Blinkzeichen	Störungsanzeige	Steuereinheit Zustand	Bemerkung
5	Park Brake fault	Antrieb unterdrückt	Überprüfen Sie,daß sich die Bremslüftung in der Normal-Stellung Befindet. Bitte wenden Sie sich an Ihren Vertragshändler.
6	Speed control out of neutral	Antrieb unterdrückt. Betrieb möglich nach erreichen der neutralen Position.	Bitte bringen Sie den Geschwindigkeitsregler in die neutrale Position. Bitte wenden Sie sich an Ihren Vertragshändler.
7	Speed control fault	Antrieb unterdrückt	Bitte wenden Sie sich an Ihren Vertragshändler.
8	Motor fault	Antrieb unterdrückt	Bitte wenden Sie sich an Ihren Vertragshändler.
9	Internal (Controller) fault	Antrieb unterdrückt	Bitte wenden Sie sich an Ihren Vertragshändler.

Unterhalt

1 Alle elektrischen Verbindungen zu der Steuereinheit sollten regelmäßig überprüft werden. Lose, korrodierte oder beschädigte Stecker sollten ersetzt werden.

2 Alle Schaltstellungen der Steuereinheit sollten regelmäßig überprüft werden, am besten an einem sicheren Ort, um deren korrekte Funktion zu gewärleisten.

3 Die Steuereinheit sollte von Schmutz und Staub freighalten werden. Zur Säuberung benutzen Sie bitte ein Tuch befeuchtet mit warmem Wasser oder Alkohol. Auf KEINEN Fall Lösungsmittel.

4 Sollten Sie irgendwelche Zweifel haben, dann wenden Sie sich bitte an Ihren nächsten Vertragshändler oder Lieferanten.

5 Die Steuereinheit beinhaltet keine wartungsbedürftigen Teile, versuchen Sie daher nicht das Gehäuse zu öffnen.

Vorsicht : Wenn die Steuer-oder Programmier-Einheit beschädigt ist oder ein Versacht auf innere Beschädigungen besteht (zum Beispiel nach einem Fall) dann lassen Sie das Gerät bitte von dem Vertragshändler überprüfen.

Sicherheits und Mißbrauchs Hinweise

1 Bitte lesen und beachten Sie alle Hinweise. Wenn Sie im Zweifel sind, dann suchen Sie bitte fachgerechten Rat.

2 Die Steuereinheit darf nicht anders verwendet werden, als die Installations-Hinweise in diesem Handbuch vorschreiben.

3 Die komplette Installation muß gründlich auf ihre Sicherheit hin überprüft werden, bevor das Gerät verschickt wird. Die programmierbaren Parameter sollen so eingestellt werden, daß ein sicherer Betrieb gewährleistet wird.

4 Wenn die Steuereinheit das Fahrzeug zu zum unerwarteten Stillstand bringen könnte, dann muß dem Betreiber ein Warnsignal erteilt werden. Wenn die Sicherheit des Betreibers wichtig ist, dann wird das Anbringen wie auch das Tragen von Sicherheitsgurten empfohlen.

5 Bitte benutzen Sie die Steuereinheit nur wenn Sie die vollständige Kontrolle über das Gerät haben. Bitte wählen Sie einen Geschwindigkeitsbereich, in dem Sie sich sicher fühlen.

6 Bitte bedienen Sie die Steuereinheit nicht wenn sich diese ungewönlich verhält, öberhitzt ist, qualmt oder Funken sprüht. Bitte wenden Sie sich in solchen Fällen an Ihren Vertragshändler.

7 Bitte schalten sie die Steuereinheit ab wenn das Fahrzeug nicht benutzt wird.

8 Bitte bedienen Sie die Steuereinheit nicht, wenn die Batterie fast leer ist. Leistungsverlust unter kritischen Bedingungen könnte zu gefährlichen Situationen führen.

9 Bitte bedienen Sie die Steuereinheit nicht, solange das Aufladegerät angeschlossen ist.

10 Die Messerkontakte des DS100/DS161 dürfen nicht berührt werden, um elektrostatische Beschädigungen zu vermeiden.

11 Bitte informieren Sie den Hersteller der DS100/DS161 von Störungen, gegebenenfalls durch Ihren Vertragshändler.

Vertragshändler

Mit Schwierigkeiten oder Fragen bezüglich Ihres DS100 wenden Sie sich bitte an:

Hauptbüro

Dynamic Controls Limited
Print Place
Christchurch
Neuseeland

Telefon: Int. 64 3 338 0016
Fax: Int. 64 3 338 3283

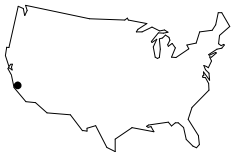
Australien

Electronic Mobile Service (EMS)
46 Berripa Close
North Ryde, Sydney
NSW Australien 2113

Tel 24 hours: Int. 61 2 9887 2824
Pager: Int. 61 2 9963 1778
Fax: Int. 61 2 9887 2114

Nord Amerika

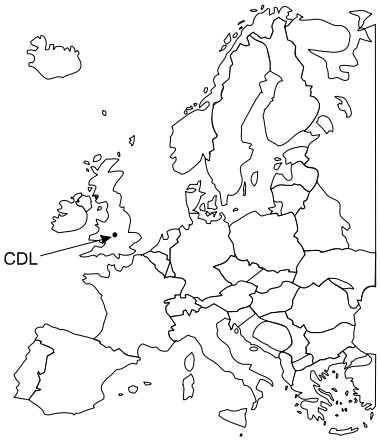
Rosstron Inc
1521 W. 259th St
Harbor City, CA 90710
USA



Telefon: Int. 1 310 539 6293
Fax: Int. 1 310 539 4078

Europa

Controls Dynamic Ltd
Lisle Avenue
Kidderminster
DY11 7DL
United Kingdom



Telefon: Int. 44 1562 820 055
Fax: Int. 44 1562 742 720

Beachten : Die Steuereinheit sollte nach ihrem Einbau mit einem gut sichtbaren Etikett versehen werden, welches die Telephonnummer des Vertragshändkers trägt.

APPENDIX A : SPECIFICATIONS

Technical Specifications - DS100

Description	Rating
Recommended Motor Type	Permanent Magnet
Switching Frequency	15.6KHz
Nominal Battery Voltage	24 Volt
Voltage Operating Range	17.5 to 31 Volt
Voltage Drop	0.85 Volt @ 40 Amp
Nominal Current Limit	100 Amp
Continuous Rating	30A @ 25°C ambient
Nominal Braking Current	100 Amp
Quiescent Current	1.25mA after 10 minutes (sleep mode)
Parking Brake Output	1.3 Amp
Minimum Armature resistance	5 Milliohms
External Speed Control	3 Wire 5k Ohm Linear Potentiometer
Forward/Reverse Control	Bi-directional or Single direction lever with Reverse switch
Neutral Throttle Brake	Motor plug braked into neutral - Power ON Un-braked - Power OFF
Enclosed Weight	930 gram
Controller Dimensions	161mm x 124mm x 50mm 161mm x 150mm x 50mm including connectors and wiring harness
Control Lead Connections	5 plugs (AMP)
Power and Motor Lead Connections	3 plugs (AMP)
Operating Ambient Temperature	-10 to 50°C
Operating Altitude	3000 metres
Operating Humidity	0 to 85%
EMC	ISO7176-21
Performance and Safety	ISO7176-14

Technical Specifications - DS161

Description	Rating
Recommended Motor Type	Permanent Magnet
Switching Frequency	15.75KHz ± 0.08KHz
Nominal Battery Voltage	24 Volt
Voltage Operating Range	17.5 to 31 Volt
Maximum Voltage Drop	0.85 Volt @ 40 Amp
Peak Motor Current (2 second rating)	160 Amp ± 10 Amp
Minimum Continuous Rating	30A @ 25°C ambient
Peak Dynamic Braking Current (2 second rating)	160 Amp ± 10 Amp
Nominal Quiescent Current	1.25mA after 10 minutes (sleep mode)
Maximum Parking Brake Output	1.3 Amp
Minimum Armature resistance	5 Milliohms
External Speed Control	3 Wire 5k Ohm Linear Potentiometer
Forward/Reverse Control	Bi-directional or Single direction lever with Reverse switch
Neutral Throttle Brake	Motor plug braked into neutral - Power ON Un-braked - Power OFF
Enclosed Weight	930 gram
Controller Dimensions	161mm x 124mm x 50mm 161mm x 150mm x 50mm including connectors and wiring harness
Control Lead Connections	5 plugs (AMP)
Power and Motor Lead Connections	3 plugs (AMP)
Operating Temperature Range	-10 to 50°C
Operating Altitude	3000 metres
Operating Humidity	0 to 85%
EMC	ISO7176-21
Performance and Safety	ISO7176-14