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Safety Notes:

When working on electric vehicles, sudden unexpected events can occur, it’s recommended to:

• Place the drive axle on jack stands—wheels off the floor.
• When working on wiring or batteries, always remove rings, watches and secure dangling clothing/hair/jewelry.
• Use the proper safety equipment, eye protection, and insulated tools.
• Never connect a computer while the vehicle is being charged.
• Disconnect batteries before installing or working on the Alltrax controller.
• Wear safety glasses.
• Because hydrogen can build up due to gassing from the batteries, work in a well ventilated area.
• Make sure the battery pack is fused.
• Do not clean the controller with a high PSI pressure washer.
• When cleaning batteries, take precautions to keep the battery acid from splashing on the controller.

CAUTION:
It is the installer’s responsibility to ensure the correct equipment (i.e. wire, motor, solenoid, fuse etc) is installed in the vehicle. Equipment should be sized correctly for planned usage. Failure to do so could poses a significant risk of explosion, fire, property damage and serious injury or death.
WARNINGS

FIELD MAPS

Alltrax XCT performance controllers have programming that is specific to the motor they are being paired with known as a field map (controls power). It’s crucial that the field map be correct to keep the motor from over-heating while providing the best possible performance. The controllers generally come programmed for the stock motor unless otherwise specified. If you are unsure if you have the proper field map or are changing motors. Please contact Alltrax technical support.

USABILITY STATEMENT

Alltrax Inc’s lines of Series and Shunt Motor Controllers are intended for use with motors only. Any application or usage that does not meet these criteria WILL NOT be covered by warranty. Also, any requests for design assistance or technical support outside the scope of the product intended use may be denied. Alltrax assumes no liability for any damage or injury as a result of use of the motor controllers in a non-traction or process motor application. See the warranty at the end of this manual.

WARNING: Use of this product for other than these specified uses may be highly dangerous and lead to serious injuries or death.

WARNING: The use of this product for the production of Plasma Assisted Hydrogen, Brown’s Gas, HHO (H20 Hydrogen Electrolysis) or any other type of gas is prohibited. Generation and storage of these gasses is extremely dangerous and poses a significant risk of explosion, fire, property damage and serious injury or death.
# XCT/NCT SPECIFICATIONS

![Image of Shunt Motor Controller](http://www.alltraxinc.com)

<table>
<thead>
<tr>
<th>Model</th>
<th>2 Min (Amps)</th>
<th>5 Min (Amps)</th>
<th>Continuous (Amps)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCT48275</td>
<td>275</td>
<td>175</td>
<td>125</td>
</tr>
<tr>
<td>XCT48300</td>
<td>300</td>
<td>200</td>
<td>125</td>
</tr>
<tr>
<td>XCT48400</td>
<td>400</td>
<td>250</td>
<td>140</td>
</tr>
<tr>
<td>XCT48500</td>
<td>500</td>
<td>400</td>
<td>250</td>
</tr>
</tbody>
</table>

**Type:** Shunt Motor Controller  

**Operating Frequency:** 18kHz  

**Controller Voltage, KSI & Reverse:**  
- NCT48xxx: 24-48C nom, 62V max  
- XCT48xxx: 24-48V nom, 62V max  

**Operating Temperature:** -20°C to 85°C, shutdown @ 95°C  

**Environmental Operating Temperature:** -20°C to 50°C  

**Standby Current (Power up):** <1W nom, <8W Fan on  

**KSI & Rev Pin Input Current:** <20mA  

**Relay Drive Current:** 5A peak, 1A Cont.  

**Throttles Supported:** 0-5k, 5k-0, E-Z-GO ITS, Club Cart  
- 5k-0 3 Wire (MCOR), 0-5v, USB Throttle, Absolute Mode  

**Terminal Bolt Torque:** Torque bolts to 60-80 in.lb (5-7ft.lb, 6.77-9.4nm)  

**Mounting Bolt Torque:** Torque bolts to 15-20 in.lb (1.25-1.75 ft.lb, 1.7-2.25nm)
The XCT/NCT Controller DOES NOT need a Pre-Charge Resistor installed on the solenoid. The controller handles pre-charge internally through the Tow/Run switch.

### Installation

<table>
<thead>
<tr>
<th>Contactor Size</th>
<th>Diode</th>
<th>Diode Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>70A-200A Solenoid</td>
<td>1N4004</td>
<td>1A</td>
</tr>
<tr>
<td>400A-550A Solenoid</td>
<td>1N5408</td>
<td>3A</td>
</tr>
<tr>
<td>600A or larger Solenoid</td>
<td>MR754</td>
<td>6A</td>
</tr>
</tbody>
</table>

The diode across the coil terminals safely dissipates the energy when the coil is turned off. Installation Dependant, refer to applicable drawing.

### Pre-Charge Resistor Mounting

The XCT/NCT Controller DOES NOT need a Pre-Charge Resistor installed on the solenoid. The controller handles pre-charge internally through the Tow/Run switch.
**Contactors (Solenoids)**

The solenoid is the primary disconnect of the battery pack in the case of an emergency. In order to be effective, the solenoid needs to be properly rated for the current that will be drawn from the batteries. It is VERY important that the solenoid be rated correctly. It is the only way to disconnect the batteries from the motor/controller loop in case of a failure. Too small of a solenoid increases the likelihood that the contacts will weld together and not be able to open.

When installing a new controller, Alltrax recommends the OEM solenoids be replaced with a heavy duty version. See below for suggested sizing of solenoid replacements.

As a regular part of a preventative maintenance plan, solenoids should be replaced every 3-5 years.

---

**STANDARD DUTY**

Flat lands with moderate speed and torque performance expectations.

- **OEM Stock 100 AMP**
  - Use with 300A controllers.
  - (Consider upgrading to a heavy duty 200A solenoid with Alltrax Controllers)
HEAVY DUTY

High performance, high speed, maximum torque, pulling loads, hilly terrain or Hunting Buggies.

Performance 200 AMP
(600amp Inrush)
Use with 300A and 400A Controllers
Suggested types:
SW180
W&R 586 (Shown)

Heavy Duty 200 AMP
(800A Inrush)
Use with 300A to 500A Controllers
Suggested types:
MZJ200 (Shown)

Heavy Duty 400 AMP
(1000A Inrush)
Use with 500A Controllers
Suggested types:
SW200
MZJ400 (Shown)
**Fuse**

Any application where there is a battery pack, a fuse must be installed. A fuse will open the battery circuit and prevent any serious damage from occurring.

The fuse should be installed on or between the battery terminals. The main battery positive OR main battery negative OR in-between 2 batteries is an acceptable location for fuse installation. The fuse must be rated for pack voltage and fault current.

<table>
<thead>
<tr>
<th>Controller Amperage</th>
<th>Fuse Style / Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>400A or less</td>
<td>ANN / 250A</td>
</tr>
<tr>
<td>450A or more</td>
<td>ANN / 400A</td>
</tr>
</tbody>
</table>

Diagram: Fuse terminal hardware
Wiring

Wiring and battery health in an electric vehicle are very important and overlooked during performance upgrades. Wiring size is important for safety and proper operation of the vehicle. Undersized wires will affect the performance of controllers and can overheat. Wires should be crimped with proper sized terminals and tools to provide a clean low resistance connection.

<table>
<thead>
<tr>
<th>Controller</th>
<th>Min. Wire AWG Standard Duty</th>
<th>Min. Wire AWG Heavy Duty</th>
</tr>
</thead>
<tbody>
<tr>
<td>200/300A</td>
<td>OEM -6 AWG</td>
<td>4 AWG</td>
</tr>
<tr>
<td>400A</td>
<td>4 AWG</td>
<td>2 AWG</td>
</tr>
<tr>
<td>500A</td>
<td>2 AWG</td>
<td>1/0 AWG</td>
</tr>
</tbody>
</table>

Power Wiring

When running wiring for the vehicle care must be taken for proper wire routing. Power wiring should be of proper sizing and ran as low in the framework of the vehicle as practical. Lengths of power wire runs need to be kept short and pairs of wires from common circuits should be grouped together to reduce EMC emissions. Secure all power wiring to the vehicle framework.

Signal Wiring

Signal wires should be keep as short as practical. Care should be taken to protect the wires sharp edges and rubbing. Consider the use of split loom or braided wire sheathing. Fasten bundles securely to framework. Do not route the signal wires together in the same bundle with power wires.
**Speed Sensor Information**

The speed sensor is a small group of wires attached the end of the motor. Using a 4 or 8 pole magnet bolted to the armature, it measures the RPM of the motor.

The majority of separately excited motors will come with a speed sensor on them, the E-Z-Go DCS and old Club Car “Regen 1/2” carts are the exception. All XCT controllers are programmed to look for the speed sensor on the motor but can be programmed to ignore it like our old DCX line.

You can disable/enable the speed sensor using the Alltrax Toolkit. In the ‘Controller Settings’ tab you will find an ‘Enable Speed Limit’ check box. If checked the controller looks for a signal from the speed sensor.

**Common Problems:**

- **Cart takes off strong but levels out at a very slow speed.**
  Speed sensor could be missing or broken. Try disabling, if it corrects the problem replace the speed sensor or magnet.

- **Jerking response/rough feeling throttle.**
  Could be speed sensor related, try disabling, if the problem ceases - change your speed sensor and magnet.

- **The cart feels like it is travelling half speed but the monitor shows full RPM.**
  Try selecting a different pole count. (if 4 is selected try 8)
VEHICLE INSTALLATION DRAWINGS

Don’t see a drawing that suites your needs? Visit our website for full sized, updated and more drawings.
www.alltraxinc.com
UNIVERSAL ADAPTER MOUNT
(OPTIONAL)

The XCT Family of controllers offers a Universal Mounting system to allow for faster installation of Alltrax Controllers. Using the original mounting holes, the adapter plate bolts to the cart and the controller to the plate.

Each mounting kit is specific to a make/year of golf cart. Check with your dealer to get the correct kit for your application. Instructions are provided with the kit. The instructions below are for provided for convenience and may not reflect your mounting kit.

GENERAL INSTALLATION INSTRUCTIONS

1. Insert the 4 HEX NUTS (1/4-20 nuts) into the adapter at the locations as shown (Fig 1) The nuts are on the back side of the mounting adapter plate. The Nyloc plastic faces out, press them flush with the surface.

2. Follow the directions included with the UAM.
   -- Alternatively, place adapter plate against the mounting plate and visually locate the appropriate mounting holes and note which holes on the adapter to use.

3. Place the adapter plate onto the golf cart controller with the ALLTRAX Logo on mounting plate facing you with the 4x NUTS against the carts mounting plate.

4. Install and tighten the supplied flat head screws into the locations identified in Step 2. DO NOT OVERTIGHTEN.

5. Mount the controller to the plate with the 4 mounting bolts (1/4-20 x 1.5” Socket Cap) with small diameter flat washers. (Fig 2) The washers MUST be installed on the bolts to protect the plastic controllers mount lugs. DO NOT OVERTIGHTEN.
(Fig 1) Nyloc nut locations from Step 1

(Fig 2) Controller Mounting shown with bolts and washers
FN - PROGRAMMING BOX
(OPTIONAL- XCT ONLY)

Customizable Knobs --
Use Alltrax Toolkit 3.0 or higher to set the ranges of each of the knobs and create personality profiles.

Adjust the drive performance how you want it while driving. Each knob can be adjusted to give you the lower and upper limits you want in the Toolkit software.

Use the free Alltrax Toolkit program to set the min/max values for your Speed/Acceleration/Regen sliders as well as the User Profiles.

Its quick and easy to set the range of the performance for your driving style.

FN2
Speed - Controls Speed, Acceleration or Both
Regen - Adjusts the cart Regen Braking Power

FN-KS
Mode - Switch between 1 of 3 customizable User Profiles.
Regen Knob adjusts the cart Regen Braking Power
FN - PROGRAMMING BOX
(OPTIONAL - XCT ONLY)

Installation:
Easy to install, just plug the FN box into the connector on the controller, start the Toolkit program, select the FN box you have and set your preferences.

Visit our Youtube channel for instructional videos
http://www.youtube/alltraxinc
The XCT family of controllers also includes an optional Fan Cover. This cover comes standard on the 500A controllers.

Installation:

1) Plug Fan Cover into controller fan port. (See picture)

2) Fasten cover down with the four (4) supplied screws.

Note: Make sure wires are not tucked out of the way and are not being pinched by the cover.
Controllers ordered for stock configurations are pre-programmed from Alltrax and it is not necessary to re-program unless the customer has specific needs. If the controller does need to be programmed it can be done via a USB A to B cable and the Alltrax Toolkit program. Visit our website for more information on programming the controller including the Alltrax Toolkit Manual (DOC113-002) and instructional videos.

Settings Screen

Throttle Screen

Controller Info Tab

Monitor Screen
On power up, the controller will blink out a throttle code and then a Status or Error Code (see below)

**Throttle codes:**
- 1 Green LED Flash = 0-5k throttle
- 2 Green LED Flash = 5K-0 throttle
- 3 Green LED Flash = 0-5V throttle
- 4 Green LED Flash = EZGO ITS throttle
- 5 Green LED Flash = Club Car, G19, G22
- 6 Green LED Flash = 6 to 10.5 Taylor Dunn throttle
- 7 Green LED Flash = Reserved
- 8 Green LED Flash = Reserved
- 9 Green LED Flash = Pump
- 10 Green LED Flash = USB Throttle
- 11 Green LED Flash = Absolute Throttle

**Normal Display Status:**
- Solid Green Light = Controller Ready to Run
- Solid Red Light = Controller in programming mode
- Solid Yellow Light = Throttle is wide open and the controller is NOT in Current Limit
- Blinking Yellow Light = Throttle is wide open, but the controller is in Current Limit

**Error Codes:**
XCT/NCT Alarm Codes flash a number of times green then red. All alarms are self clearing and will repeat until the error condition has been corrected.

- 1 Green and 1 Red LED Flash = Short Circuit/Output Fault
- 1 Green and 2 Red LED Flash = Battery Under Voltage
- 1 Green and 3 Red LED Flash = Battery Over Voltage
- 1 Green and 4 Red LED Flash = Over temperature
- 1 Green and 5 Red LED Flash = Motor Field Failure
- 1 Green and 6 Red LED Flash = Pre-charge Failure
- 2 Green and 1 Red LED Flash = Under Temp
- 2 Green and 2 Red LED Flash = Not Used
- 2 Green and 3 Red LED Flash = High Throttle Over range
- 2 Green and 4 Red LED Flash = High Throttle Under range
- 2 Green and 5 Red LED Flash = Low Throttle Over range
- 2 Green and 6 Red LED Flash = Low Throttle Under range
- 3 Green and 1 Red LED Flash = Uncalibrated throttle
- 3 Green and 2 Red LED Flash = Bad Variable Set Loaded
**Error Code Definitions:**

- **Short Circuit/Output Fault:**
  Controller detected a short circuit or other fault on the output circuit. Check wiring.

- **Battery Under Voltage:**
  B+ Voltage lower than Low Voltage Battery Setting. Check pack voltage or program settings.

- **Battery Over Voltage:**
  B+ Voltage Higher than Over Voltage Battery Setting. Check pack voltage or program settings.

- **Over temperature:**
  Busbar temperature exceeds 85°C. Let controller cool and/or add fan.

- **Motor Field Failure:**
  Controller detected a short in the field circuit. Check motor resistance and or replace field wires.

- **Pre-charge Failure:**
  B+ voltage and KSI voltage differ by more than 5v. Stuck solenoid.

- **Under Temp:**
  Busbar Temperature reads less than -20°C

- **High Throttle Over range & High Throttle Under range:**
  High Side of throttle signal is outside of acceptable window for that throttle type. Check and/or replace throttle. Change throttle type to correct throttle installed on car.

- **Low Throttle Over range & Low Throttle Under range:**
  Low Side of throttle signal is outside of acceptable window for that throttle type. Check and/or replace throttle. Change throttle type to correct throttle installed on car.

- **Uncalibrated throttle:**
  Throttle boundaries not found. In Toolkit program, select another throttle then re-select correct throttle type.

- **Bad Variable Set Loaded:**
  Alltrax loaded variable data is missing or corrupted. Contact Alltrax.
WARRANTY STATEMENT

Alltrax, Inc., (hereafter Alltrax) warrants that the product purchased is free from defects in materials or workmanship for a period of 2 years from the date of manufacture. This warranty does not apply to defects due directly or indirectly to misuse, abuse, negligence, accidents, repairs, improper installation, submersion, alterations or use contrary to any instructions provided by Alltrax in verbal or written form.

In the event you should need warranty repair, contact Alltrax at (541) 476-3565 to receive warranty service authorization instructions for returning the defective product to Alltrax for evaluation. Products or parts shipped by customer to Alltrax must be sent postage paid and packaged appropriately for safe shipment. Alltrax is not responsible for customer products received without warranty service authorization and may be rejected.

Alltrax reserves the right to repair or replace merchandise at its option at no cost to the customer, except for shipping costs of sending the defect item to Alltrax. Replacement shall mean furnishing the customer with a new equivalent product to the defective item. Alltrax also reserves the right to make changes to any of its products or specifications without notice.

Alltrax assumes no liability for applications assistance or customer product design. Customers shall be responsible for evaluating the appropriateness of the use of any Alltrax product in any application. Customers shall provide adequate design and operating safeguards that are in compliance with standard practices of other similar applications or any standards of any governing agency.

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