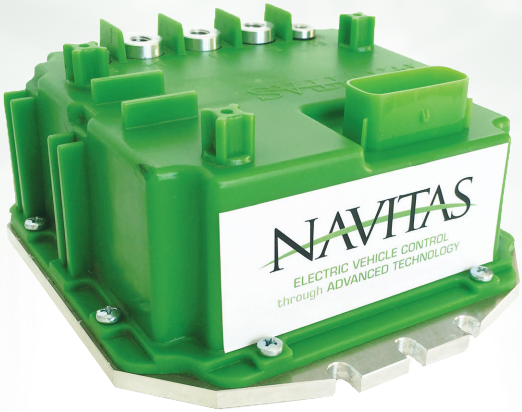
NAVITAS Vehicle Systems Ltd.

NAVITAS 440A-600A
FOR SHUNT WOUND AND *SERIES* DC MOTOR CONTROLLER
Installation/Service Manual



Instructions for:

Club Car Precedent & DS with Curtis 1510/1515 Controller

E-Z-GO TXT 48V with Curtis 1206HB Controller

E-Z-GO TXT 36V with Curtis 1206MX Controller

Yamaha Drive with Moric Controller JW2

Also compatible with:

Curtis 1520, 1268 (Resistive Throttle)

Curtis 1264, 1268 (ITS Throttle) ITS E-Z-GO 48V

Yamaha G19/G22

This manual is available online at NavitasVS.com

NAVITAS

NAVITAS
VEHICLE SYSTEMS LTD.

Please refer to Navitas online manuals and installation videos for the most up-to-date install information;
www.navitasvs.com/manuals

Wear Eye Protection!

TABLE OF CONTENTS

BEST PRACTICES

To maximize your vehicle's driving Range only use the speed you need

- Use the Speed Knob to Control your maximum cruising Speed if using an OTF. Turn the speed down to the minimum practical speed necessary for the application. The controller significantly increases the operating efficiently of the motor as the maximum speed adjustment is reduced
- Minimize Acceleration - Hard acceleration demands high in-rush currents from the battery pack. This increases wear and tear on both the motor and the mechanical systems.

Hill Descent

- Use Regenerative Braking for Hill Descent - It puts energy back into the battery and it increases the life of your brakes. Regenerative braking can be applied gradually and can reduce the likelihood of losing traction when going down a hill.

Motor Overheating

- If you observe the motor temperature warning (1-4 flash) the controller has reduced the power going to the motor. Stop and let the motor Cool down. The system will reset automatically.
- If you cycle the key, it will temporarily override the power fold–back but can lead to motor damage if it is done continuously.

Low Battery Warning

- When the Battery Discharged Warning (1-5 flash), the controller will reduce the amount of power it supplies to the motor to protect the motor.
- Cycling the key will reset full controller power for 1 minute but doing so repeatedly will adversely affect the life of your motor. Recharge the batteries as soon as possible.

Speed and Torque System

- If you notice that your motor or cables are becoming too hot to touch, then your application is probably too demanding and we recommend that you upgrade the motor to a Heavy-Duty unit and the cables to at least 4 AWG.

Warnings

- Always monitor the motor & battery wiring temperatures after changing the programmer settings (if one is present) – particularly when going to higher speeds
- If your battery pack is full, the amount of Regenerative Braking is reduced since the controller has nowhere to put the excess energy.
- It is recommended that motor armature and battery wires be upgraded to a min of 4awg cable, with 2awg being preferable. Field wires do not ned to be upgraded. Solenoids should be upgraded from stock to 200A HD

Wear Eye Protection!

INTRODUCTION

NAVITAS TSX 3.0 440A 36-48V Controller & TSX 3.0 600A 36-48V Controller SERIES & SHUNT WOUND DC MOTOR CONTROLLER

The owner, and all vehicle operators MUST Read and Understand All Warnings and Instructions in this manual and in the Vehicle Owner/ Operator's Manual. The owner of this vehicle assumes all liability for accidents, injuries or damages if the warnings and instructions are not followed.

Navitas Vehicle Systems Ltd. assumes no responsibility for errors or omissions in this manual, in regards to liability or damages resulting from the use of information contained in the manual. If it is lost or damaged please contact your local dealer.

Navitas Vehicle Systems Ltd. reserves the right to make changes to the controller, parts of the controller, accessories, labeling or instructions without obligation to make these changes on units previously sold.

Product and specifications are subject to change without notice or obligation.

ATTENTION:
BEFORE INSTALLING THIS CONTROLLER PLEASE RECORD THE SERIAL NUMBER LOCATED ON THE BODY OF THE CONTROLLER.

PART	SERIAL#
10-000685 TSX 3.0 600A 36-48V CONTROLLER(w/BT)	
10-000766 TSX 3.0 440A 36-48V CONTROLLER (w/BT)	

Navitas Vehicle Systems Ltd.

Vehicle Operation SAFETY WARNINGS

DANGER **FAILURE to follow the WARNINGS below can damage the Vehicle and/or cause SERIOUS INJURY OR DEATH!**

MAKE SURE TO READ and UNDERSTAND the OWNER'S INSTALLATION and SERVICE MANUAL and ALL WARNING LABELS with this Controller.

- Always proceed with caution. Keep speed low and do not drive faster than conditions permit. The terrain, conditions, and the operator's skill will determine a safe speed. Avoid sharp turns and do not accelerate quickly when turning as this can cause the vehicle to slide sideways or skid out of control. Abrupt maneuvers or aggressive driving can cause a rollover even on flat open areas.
- This Controller will increase torque, but Does Not increase the GVWR (Gross Vehicle Weight Rating), Cargo capacity, or Towing capacity of the vehicle. Always follow the Vehicle towing and loading specifications.

- Do not leave children or pets unattended in or near the vehicle. Always look behind you before and while backing up.
- Reduce speed when towing and allow more room for stopping and turning.
- Drive with wheels straight when going up and down hills. Slow down and use brakes when going down hills.
- Never drive on hills with a slope greater than 15 degrees.
- Do not drive through fast flowing water or water above the floor of the vehicle.
- If you must cross shallow water, make sure to stop and inspect the area for sudden drop-offs, large rocks or slippery surfaces. Always proceed with caution or choose a safer route.
- When towing this vehicle make sure the key is turned off, the Run/Tow switch is in Tow, and batteries main power is disconnected.
- Never exceed the towing capacity rating as specified by the vehicle manufacturer.
- Never re-wire, by-pass or change the wires, switches, or controller. Contact your dealer if vehicle is not operating correctly.
- Keep the controller and the area around it clean and free of debris. Keep electrical components dry and DO NOT wash with direct stream or power washer
- Driver must be a minimum of 16 years of age with a current driver's license, or be accompanied by a parent or legal guardian when operating the car.
- Modifying motor controller parameters may change vehicle acceleration, braking and top speed behavior. Please verify vehicle performance before the use and obey Federal, County and Municipality bylaws and regulations.
- Product use is for Golf Car and Low Speed Vehicle Market (LSV) Application and May Operate at Speeds Up to 25 MPH. Factory settings on controller have been set using: 18 inch Tall Tires, Non-Performance Motor & Up to 25 MPH Limit With Vehicle Speed Sensor Installed.
- Operator's/User's of Navitas Golf Car and LSV Equipped Products Must Follow Published Golf Car & LSV Federal, County & Municipal Bylaws & Regulations Issued For Your "Use Area". For Operation/Use Beyond Golf Car & LSV Regulations/Guidelines, Full Liability Is Assumed By Operator's/User's.
- Do not drive vehicles while influenced by Alcohol, Medications & Drugs as this may/will impair your safe driving use.
- User to verify that Golf Car & LSV Vehicle Mechanical Brakes are fully functional prior to continued operation of vehicle.
- Vehicle & all parts must be serviced by qualified service personnel. For an authorized service location see your local dealer or visit our web site at www.NavitasVS.com.

CONTROLLER PARTS LIST

Confirm that all parts listed below are with your kit before starting installation. This kit includes either the TSX 3.0 440A 36-48V Controller or the TSX 3.0 600A 36-48V Controller. If you are missing parts, please contact your local dealer.

	PART DESCRIPTION	PART #	QTY
1	TSX 3.0 600A 36-48V Controller	10-000685	1
2	TSX 3.0 440A 36-48V Controller	10-000766	1
3	M8 X 16 Hex Cap 8.8 Zinc (Not Shown)	80-000901	3
4	M6 X 16 Hex Cap 8.8 Zinc (Not Shown)	80-000902	2
5	M8 Lock Washer (Not Shown)	80-000910	3
6	M6 Lock Washer (Not Shown)	80-000909	2
7	M8 Flat Washer (Not Shown)	80-000888	3
8	M6 Flat Washer (Not Shown)	80-000889	2
9	Spade Connector 6.3MM - for Club Car Precedent & DS, E-Z-GO TXT	20-001010	2
10	2 AWG 5/16" Ring Terminal (Yamaha Drive Only!)	40-000536	1
11	Optional DC Hardware Kit for E-Z-Go	10-000770	

WIRING PARTS LIST

This kit includes only one of the Harnesses listed below. Note: some Harnesses look similar.
Make sure to check the part number and description label on the bottom of the Harness before connecting to the Controller.

	PART DESCRIPTION	PART #	QTY
1*	Harness for Curtis 1510/1515 Controller (Club Car Precedent & DS)	40-000542	1
1*	Harness for Curtis 1206MX Controller (E-Z-GO TXT 36V)	40-000512	1
1*	Harness for Curtis 1206HB Controller (E-Z-GO TXT 48V)	40-000541	1
1*	Harness for Moric JW2 Controller(Yamaha Drive)	40-000513	1
1*	Harness for Yamaha G19/G22	40-000514	1
1*	Harness for Curtis 1520, 1268 (Resistive Throttle)	40-000515	1
1*	Harness for Curtis 1264, 1268 (ITS Throttle) ITS E-Z-GO 48V	40-000516	1
1*	Harness for DCS 36V Controller (E-Z-GO TXT DCS 36V)	40-000540	1

INSTALLATION INSTRUCTIONS

ATTENTION:

- **Before installing the Controller make sure that the Golf Car's Electrical System is working properly.**
- **All components such as the Motor, Run/Tow Switch, Pedal Cluster, FWD/REV Switch and all Wiring needs to be in good condition and operating to Manufacturer's Standards.**

- **The Batteries must be in Good Condition and each Battery must hold a Charge!**
- **If the system is not working properly this must be repaired before installing this Controller!**

DANGER

FAILURE to follow the WARNINGS below can damage the Vehicle and/or cause SERIOUS INJURY OR DEATH!

Installation or Servicing of the NAVITAS 440A 36-48V & 600A 36-48V Controllers must be done by a trained golf car technician. Before installing or servicing of the NAVITAS 440A 36-48V or 600A 36-48V Controller:

- Make sure the Run/Tow Switch is in the Tow position
- The Key is turned OFF and Removed from the Ignition
- The Parking Brake is Engaged
- Before testing the Controller/Vehicle make sure ALL four wheels are off the ground and supported with jack stands.
- The area around the vehicle must be clear. Keep all People, Children and Pets away from the vehicle when installing, servicing or testing the vehicle.
- Read NAVITAS 36-48V 440A & 600A Controller Installation/Service and All Warning Labels before servicing or troubleshooting this Vehicle.
- The Controller is sealed and cannot be opened for service. To replace the Controller call your local dealer. Opening the Controller will Void the Warranty
- Wear Safety Glasses and Gloves when installing this Controller.
- Wear a Safety Shield when working in or near the Vehicle Battery Compartment.
- Use Insulated Tools to protect from electric burns.
- Never lay or put down tools in the Vehicle Battery Compartment.
- Disconnect the Main (+) Positive and (-) Negative Cable on the Vehicle's Battery System.
- **Remove pre-charge resistor from contactor and discard.**

Tools Required

- Ratchet Set
- Open End Wrench Set
- Electrical Tape
- 4 Jack Stands
- Lift Jack (2 ton or more)
- Wheel Chocks

INSTALLATION INSTRUCTIONS

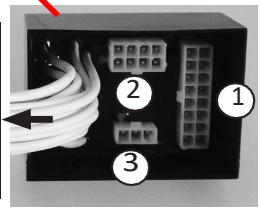
Wire & Connector Location Diagram

440A 36-48V & 600A 36-48V Controller-Harness

NOTE: The harness should be oriented and secured with Zip Ties to prevent water and debris from accumulating in the connectors

Connector Plug Location

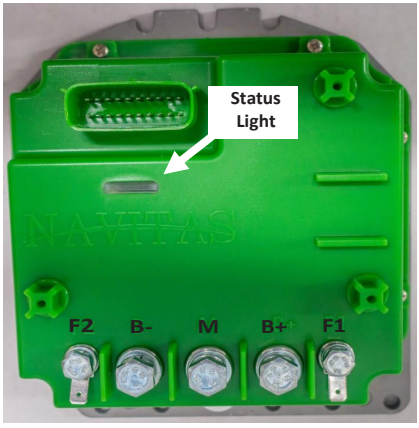
1	**Vehicle**	**16 Pin**	Vehicle Harness Connector
2	**OTF**	**8 Pin**	"On The Fly" Programmer *(Optional) Not included
3	**Reserved**	**3 Pin**	Not Used



CAUTION

DO NOT Attach any of these Connectors without the RUN/TOW SWITCH in the TOW Position!

440A 36-48V & 600A 36-48V Controller- Wire Location



F1	**FIELD WIRE**	Field Switch Wire
B-	**MAIN BATTERY NEGATIVE**	BLACK Negative Cable from Battery.
M	**MOTOR**	
B+	**MAIN BATTERY POSITIVE**	RED Positive Cable from Battery.
F2	**FIELD WIRE**	Field Switch Wire

NOTE: if F1 & F2 Field Wires are installed incorrectly, then FWD/REV will work in the opposite direction.

The NAVITAS 440A 36-48V & 600A 36-48V Controllers have a Green and Red Status Light that will indicate the status of the Controller. It is located inside the controller and is visible through the top cover when the controller is powered.

Torque Specifications

F1 & F2	**6 mm Bolt**	60 in-lbs/ 5ftlbs/ 6.8Nm
B-/M/B+	**8 mm Bolt**	150 in-lbs/ 12.5ftlbs/ 16.9Nm

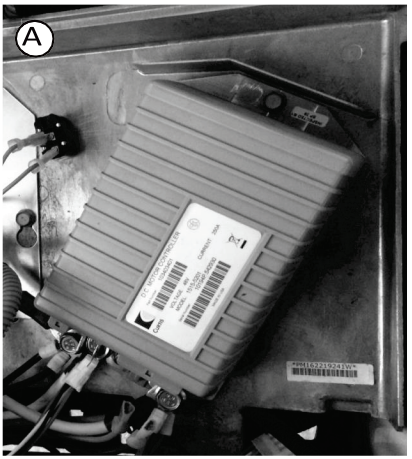
INSTALLATION INSTRUCTIONS

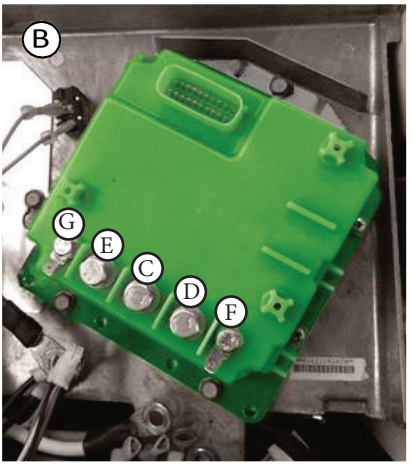
Club Car Precedent with Curtis 1510/1515 Installation

DANGER

- **Make sure the RUN/TOW Switch is in the TOW Position**
- **Make sure to Disconnect the Main Positive ⊕ and Negative ⊖ Cables on the Vehicle's Battery System.**

Before removing the original Controller, take note or take a photo of the 5 Controller Terminals and their corresponding Wires. Make sure that all groups of wires stay together.





(A) Remove the Vehicle Controller Cover (A) and the Original Vehicle controller. (A1) **Remove pre-charge resistor (shown below) from contactor and discard.**

(B) Install the Controller using the 3 screws from the original controller.

(C) Connect the Motor Cable from the original Controller to the M Terminal on the Controller using a M8 Bolt, Lock Washer and Flat Washer.

(D) Connect the Main Positive from the solenoid to the B+ Terminal on the Controller using a M8 Bolt, Lock Washer and Flat Washer.

(E) Connect the Main Negative Power Cable to the B- Terminal on the Controller using a M8 Bolt, Lock Washer and Flat Washer.

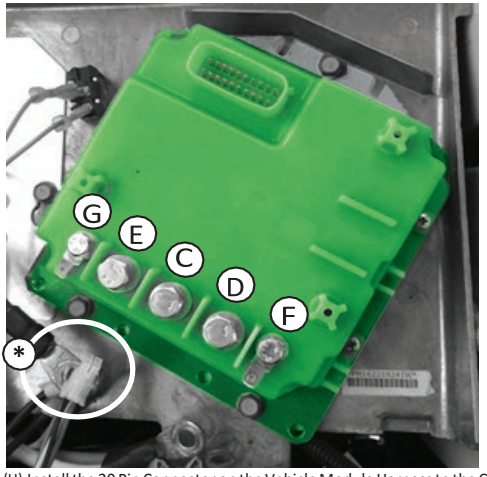
(F) Install the F1 Field Wire from the original Controller to the F1 Terminal on the Controller using a Spade Connector. (G) Install the F2 Field Wire from the original Controller to the F2 Terminal on the Controller Terminal using a Spade Connector.

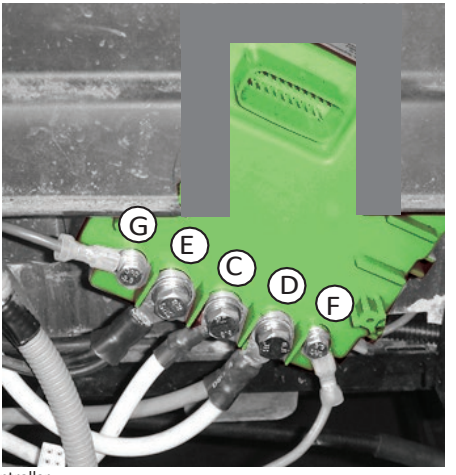
Torque Specifications

F1 & F2	**6 mm Bolt**	60 in-lbs/ 5ftlbs/ 6.8Nm
B-/M/B+	**8 mm Bolt**	150 in-lbs/ 12.5ftlbs/ 16.9Nm

INSTALLATION INSTRUCTIONS

Club Car Precedent with Curtis 1510/1515 Installation cont'd.

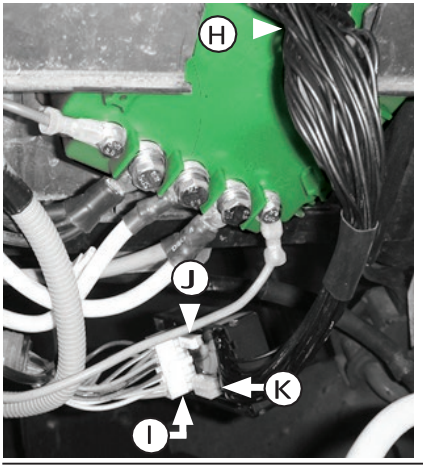




(H) Install the 20 Pin Connector on the Vehicle Module Harness to the Controller.

(I) Install the 16 Pin Connector from the Vehicle Wiring Harness to the 16 Pin Connector on the New Navitas Vehicle Module Harness.
(J) This Connector is NOT USED.
(K) This 8 Pin Connector is for the optional OTF "On The Fly" Programmer.

*There is a 4 Pin Connector on the Vehicle Harness that is used for the Club Car Programmer. This 4 Pin Connector is not used on the NAVITAS Controller and will be left unplugged.



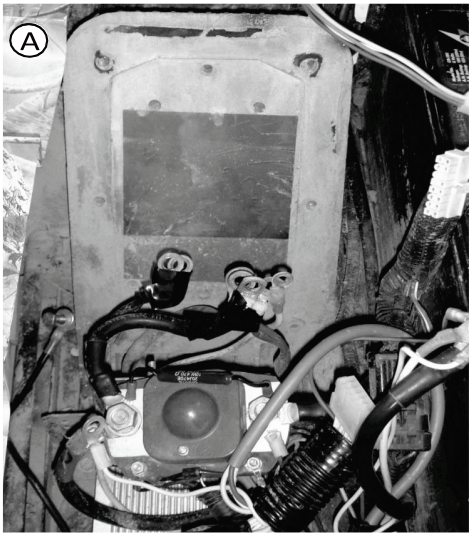
INSTALLATION INSTRUCTIONS

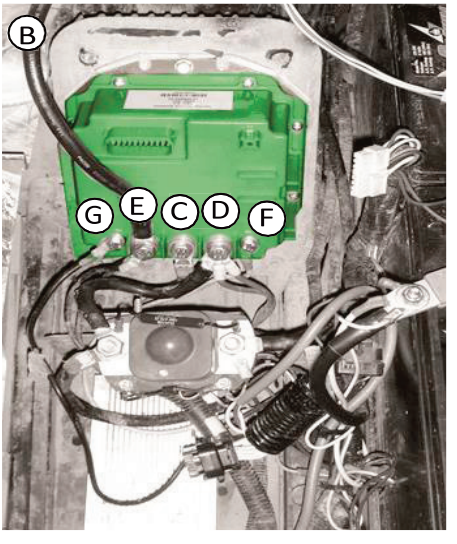
E-Z-GO TXT 48V with Curtis 1206HB Installation

DANGER

- **Make sure the RUN/TOW Switch is in the TOW position.**
- **Make sure to Disconnect the Main Positive ⊕ and ⊖ Negative Cables on the Vehicle's Battery System.**

Before removing the original Controller take note or take a photo of the 5 Controller Terminals and their corresponding Wires. Make sure that the groups of wires stay together.
Remove (A) the Vehicle Controller Cover and the Original Vehicle Controller.
(A1) Remove pre-charge resistor from contactor and discard.
(B) Install the Controller using the 3 screws from the original controller.
(C) Connect the Motor Cable from the original Controller to the M Terminal on the Controller using a M8 Bolt, Lock Washer and Flat Washer.
(D) Connect the Main Positive Red Power Cable to the B+ Terminal on the Controller using a M8 Bolt, Lock Washer and Flat Washer.
(E) Connect the Main Negative Black Power Cable to the B- Terminal on the Controller using a M8 Bolt, Lock Washer and Flat Washer.
(F) Install the F1 Field Wire from the original Controller to the F1 Terminal on the Controller using a Spade Connector. (G) Install the F2 Field Wire from the original Controller to the F2 Terminal on the Controller Terminal using a Spade Connector.





Torque Specifications

F1 & F2	**6 mm Bolt**	60 in-lbs/ 5ftlbs/ 6.8Nm
B-/M/B+	**8 mm Bolt**	150 in-lbs/ 12.5ftlbs/ 16.9Nm

INSTALLATION INSTRUCTIONS

E-Z-GO TXT 48V with Curtis 1206HB Installation cont'd.

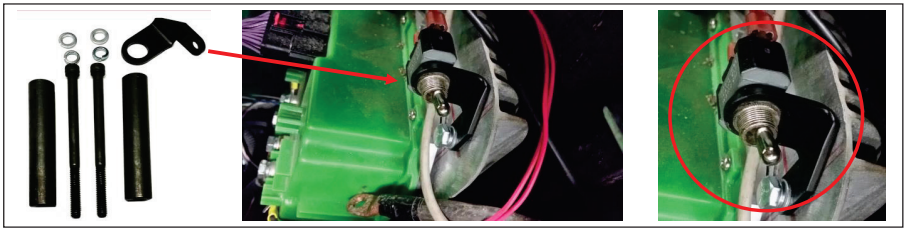
(G) Install the 20 Pin Connector on the new Navitas Harness to the Controller.

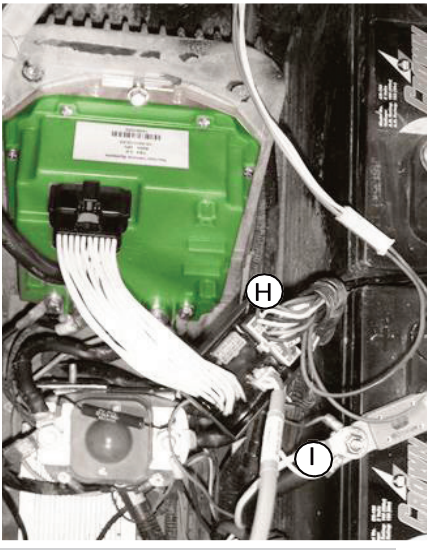
(H) Install the 16 Pin Male Connector from the Vehicle Wiring Harness to the 16 Pin Female Connector on the New Navitas Harness.

(I) The 3 Pin Connector on Harness IS NOT USED.

NOTE: The New Navitas Harness should be oriented and secured with Zip Ties to prevent wire damage and to prevent water from collecting in the molex connectors.

OPTIONAL Hardware Kit Available: Contactor stand off bolts for Install with larger Contactor & Run/Tow Switch Mount





Now the Vehicle's Main Battery Positive and Negative Cables can be re-connected to Battery Pack.

Note: Torque all battery terminals to 90 in-lbs.

INSTALLATION INSTRUCTIONS

E-Z-GO TXT 36V with Curtis 1206MX Installation

DANGER

- **Make sure the RUN/TOW Switch is in the TOW position.**
- **Make sure to Disconnect the Main Positive ⊕ and ⊖ Negative Cables on the Vehicle's Battery System.**

Before removing the original Controller take note or take a photo of the 5 Controller Terminals and their corresponding Wires. Make sure that the groups of cables and wires stay together.

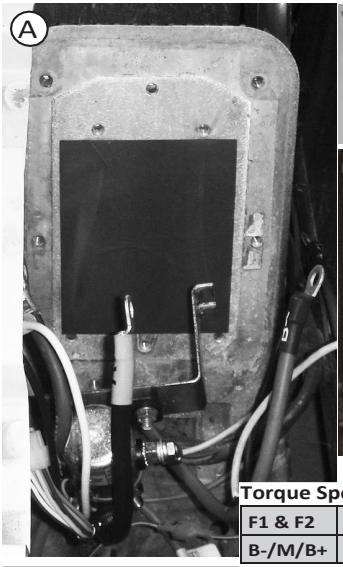
Remove (A) the Vehicle Controller Cover and the Original Vehicle Controller. Remove the Solenoid Bracket from the Solenoid and the Controller Mounting Plate. Note: The Solenoid Bracket will not be re-installed

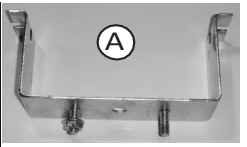
(A1) Remove pre-charge resistor from contactor and discard (refer to part photo on p 11)

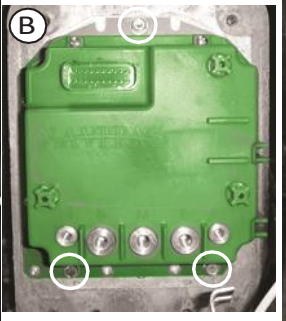
(B) Install the Controller using the 3 screws from the original controller.

Note: These Screws will be going into non-threaded holes but the Screws are self-tapping Screws and will make their own threads.

(C) Attach the Solenoid using the 2 Screws from the Solenoid Bracket to the area below the Controller. Note: There are 2 holes already drilled. If not, use a 1/4 in. – 20 bottoming tap to attach.





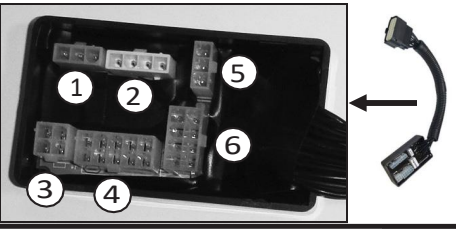


Torque Specifications

F1 & F2	**6 mm Bolt**	60 in-lbs/ 5ftlbs/ 6.8Nm
B-/M/B+	**8 mm Bolt**	150 in-lbs/ 12.5ftlbs/ 16.9Nm

Connector Plug Location **Vehicle Module Harness E-Z-GO TXT 36V**

1	**Vehicle**	**3 Pin**	Vehicle Harness Connector
2	**Vehicle**	**4 Pin**	Vehicle Harness Connector
3	**Vehicle**	**4 Pin**	Vehicle Harness Connector
4	**Vehicle**	**10 Pin**	Vehicle Harness Connector
5	**Reserved**	**3 Pin**	NOT USED
6	**OTF**	**8 Pin**	"On The Fly" Programmer *(Optional) Not included



INSTALLATION INSTRUCTIONS

E-Z-GO TXT 36V with Curtis 1206MX Installation cont'd.

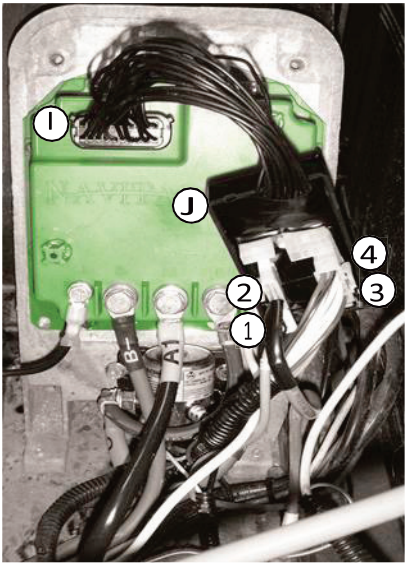
(D) Connect the Motor Cable from the original Controller to the M Terminal on the Controller using a M8 Bolt, Lock Washer and Flat Washer.

(E) Connect the Main Positive Red Power Cable from the Vehicle Solenoid to the B+ Terminal on the Controller using a M8 Bolt, Lock Washer and Flat Washer.

(F) Connect the Main Negative Black Power Cable to the B- Terminal on the Controller using a M8 Bolt, Lock Washer and Flat Washer.

(G) Install the F1 Field Wire (usually green) from the original Controller to the F1 Terminal on the Controller using a Spade Connector.

(H) Install the F2 Field Wire (usually black) from the original Controller to the F2 Terminal on the Controller Terminal using a Spade Connector.



Optional Kit:
Run/Tow
Switch Bracket

(See page 6)

See the "CONNECTOR PLUG LOCATION" Chart on the previous page and photo above to connect the Vehicle Connectors to the Harness.

(I) Install the 20 Pin Connector on the Harness to the Controller.

(J) Install the Connectors from the Vehicle Wiring Harness to the Connectors on the New Navitas Harness as shown in the "CONNECTOR PLUG LOCATION" Chart on the previous page.

NOTE: The Module should be oriented and secured with Zip Ties to prevent wire damage.

(K) If re-installing the Controller Cover with the RUN/TOW Switch the Cover, will need to be cut off at the bottom because of the new Solenoid location. Use a Saw to cut the bottom 2"'s of the Cover. Plug in the 4 pin Connector from the RUN/TOW Switch to the Harness and reinstall the Controller Cover.

NOTE: The harness should be oriented and secured with Zip Ties to prevent water and debris from accumulating in the connectors

Now the Vehicle's Main Battery Positive and Negative Cables can be re-connected.

INSTALLATION INSTRUCTIONS

YAMAHA G19/22 Installation (GE and MORIC)

DANGER

- **Make sure the RUN/TOW Switch is in the TOW position.**
- **Make sure to Disconnect the Main Positive ⊕ and ⊖ Negative Cable on the Vehicle's Battery System.**

Before removing the original Controller take note or take a photo of the 5 Controller Terminals and their corresponding Wires. Make sure that the groups of wires stay together.

Which Controller does your car have?

Determine which controller is presently installed in your car, the GE 2001-2004.5 Lowside Drive, or the Moric 2004.5-2007 Highside Drive (pictured left and right respectively in *fig. 1*), then follow the appropriate directions below.

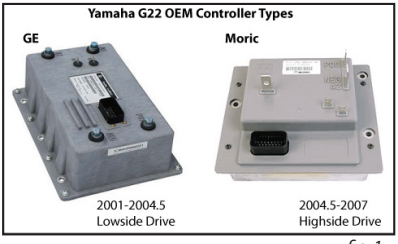


fig. 1

YAMAHA G19/22 Installation (GE)

1. If pre-charge resistor is present, then remove and discard
2. Remove GE OEM Controller
3. Install the new TSX 3.0 controller (TSX)
4. Connect A2 to M post using a M8 Bolt, Lock Washer and Flat Washer
5. Connect both A1 and Main Positive (B+) to the B+ post using a M8 Bolt, Lock Washer and Flat Washer
6. Connect Main Negative(B-) to B- using a M8 Bolt, Lock Washer and Flat Washer
7. Connect F1 from OEM Controller to F1 terminal using spade connector
8. Connect F2 from OEM Controller to F2 terminal using spade connector

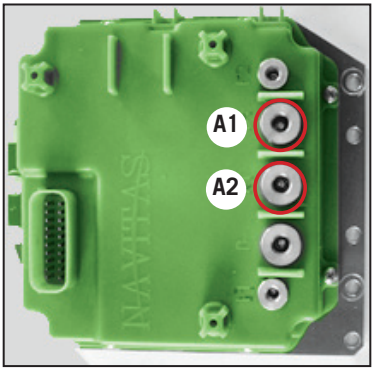


fig. 2

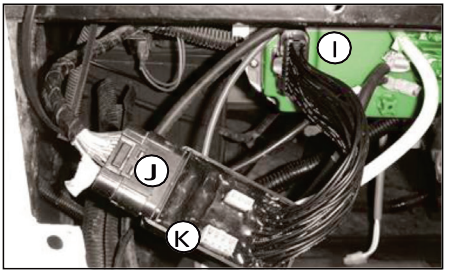
Torque Specifications

F1 & F2	**6 mm Bolt**	60 in-lbs/ 5ftlbs/ 6.8Nm
B-/M/B+	**8 mm Bolt**	150 in-lbs/ 12.5ftlbs/ 16.9Nm

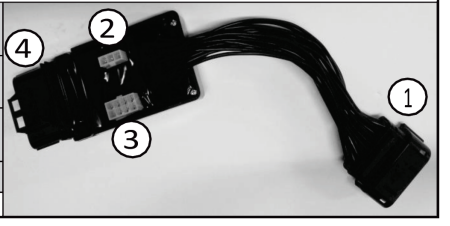
INSTALLATION INSTRUCTIONS

YAMAHA G19/22 Installation (GE) Cont'd

9. Install the 20 Pin Connector on the Navitas Vehicle Module Harness to TSX Controller
10. Install the 23 Pin OEM Connector to the Navitas Vehicle 23 Pin Module Harness
11. Optional (install 8 pin connector for the "On The Fly" Programmer).



NOTE: The harness should be oriented and secured with Zip Ties to prevent water and debris from accumulating in the connectors

Connector Plug Location				Vehicle Module Harness (Yamaha G19/22)
1	Controller	20 Pin	Controller Harness Connector	
2	Reserved	3 Pin	NOT USED	
3	OTF	8 Pin	"On The Fly" Programmer *(Optional) Not included	
4	Vehicle	23 Pin	Vehicle Harness Connector	

Now the Vehicle's Main Battery Positive and Negative Cables can be re-connected

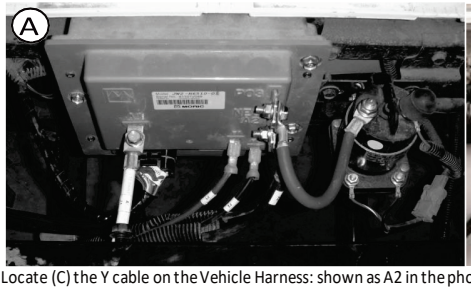
INSTALLATION INSTRUCTIONS

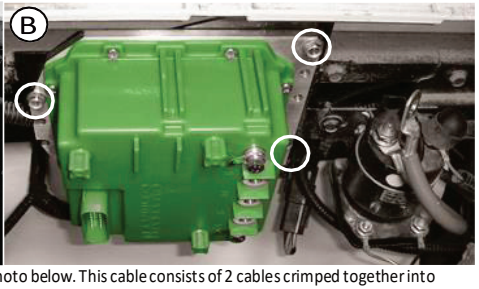
YAMAHA G19/22 Installation (MORIC)

DANGER

- **Make sure the RUN/TOW Switch is in the TOW position.**
- **Make sure to Disconnect the Main Positive ⊕ and ⊖ Negative Cable on the Vehicle's Battery System.**

Before removing the original Controller take note or take a photo of the 5 Controller Terminals and their corresponding Wires. Make sure that the groups of wires stay together.
Remove (A) the Original Vehicle Controller. (B) Install the Controller using the 3 screws from the original controller.
CAUTION: DO NOT CONNECT ANY WIRES OR CABLES UNTIL AFTER STEP C.





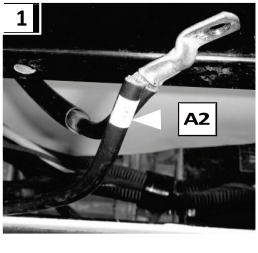
Locate (C) the Y cable on the Vehicle Harness: shown as A2 in the photo below. This cable consists of 2 cables crimped together into a Ring Terminal. The one side comes from the Battery Negative and the other side comes from the A2 on the Motor. Use a pair of side cutters to cut the A2 side of the cable at the Ring Terminal. Then crimp on a new ring terminal (included in the Harness bag). NOTE: The Ring Terminals on the original Harness may need to be drilled out to 5/16" to allow the New Harness to be connected to the new Controller.

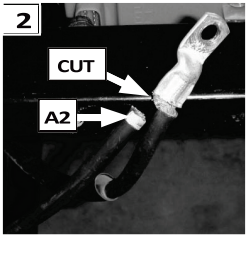
Note: OEM Cable bolts in Fig A. can be used to to mount the TSX controller to the cart in step B.

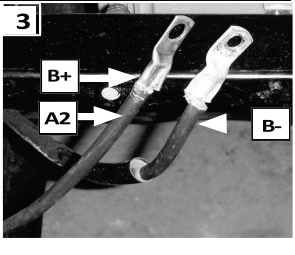
Torque Specifications

F1 & F2	**6 mm Bolt**	60 in-lbs/ 5ftlbs/ 6.8Nm
B-/M/B+	**8 mm Bolt**	150 in-lbs/ 12.5ftlbs/ 16.9Nm

C







SEE PHOTO ON FOLLOWING PAGE

(D) Connect the Motor Cable (usually white) from the original Controller to the M Terminals on the Controller using a M8 Bolt, Lock Washer and Flat Washer.

(E) Connect the Main Positive Red Power Cable from the Vehicle Solenoid and the Black A2 Cable (Cable that was cut and has the New Ring Terminal) to the B+ Terminals on the Controller using a M8 Bolt, Lock Washer and Flat Washer.

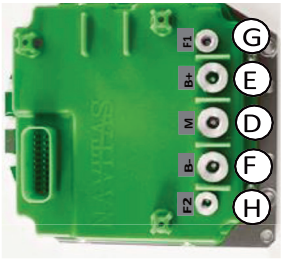
(F) Connect the Main Negative Black Power Cable (Cable from the Battery with the original Ring Terminal) to the B- Terminal on the Controller using a M8 Bolt, Lock Washer and Flat Washer.

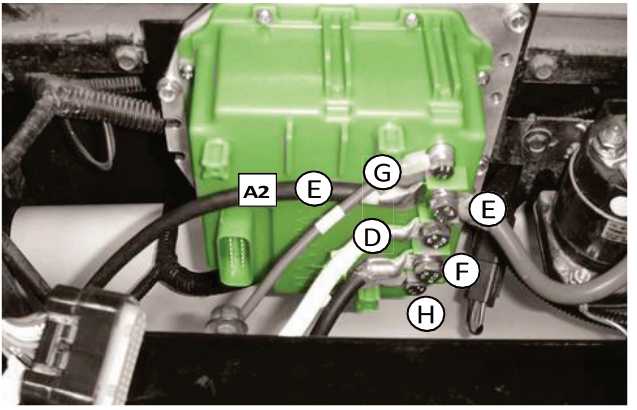
(G) Install the F1 Field Wire (usually green) from the original Controller to the F1 Terminal on the Controller using a Spade Connector.

(H) Install the F2 Field Wire (usually black) from the original Controller to the F2 Terminal on the Controller Terminal using a Spade Connector.

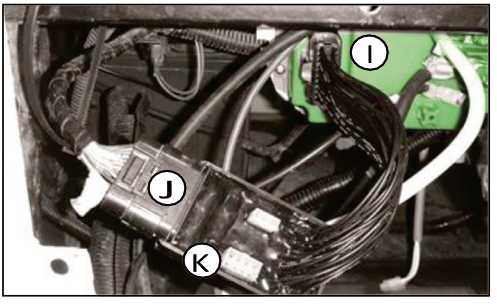
INSTALLATION INSTRUCTIONS

YAMAHA G19/22 Installation (MORIC) Cont'd



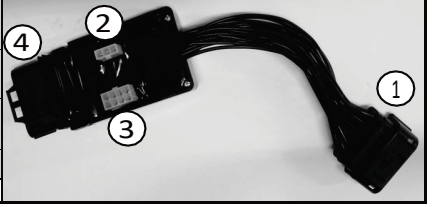


(I) Install the 20 Pin Connector on the Vehicle Module Harness to the Controller.
(J) Install the 26 PIN Connector from the Vehicle Wiring Harness to the 26 Pin Connector on the NAVITAS Vehicle Module Harness.
(K) This 8 Pin Connector is for the optional OTF "On The Fly" Programmer.



Wear Eye Protection!

NOTE: The Harness should be oriented and secured with ZipTies so that water and debris does not accumulate in the Connectors.

Connector Plug Location				Vehicle Module Harness (Yamaha DR.)
1	**Controller**	**20 Pin**	Controller Harness Connector	
2	**Reserved**	**3 Pin**	NOT USED	
3	**OTF**	**8 Pin**	"On The Fly" Programmer *(Optional) Not included	
4	**Vehicle**	**26 Pin**	Vehicle Harness Connector	

Now the Vehicle's Main Battery Positive and Negative Cables can be re-connected.

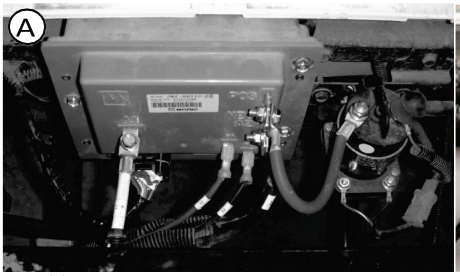
INSTALLATION INSTRUCTIONS

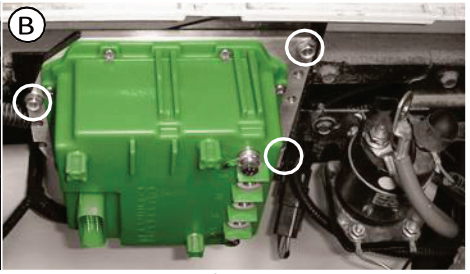
Yamaha Drive with Moric JW2 Installation

DANGER

- **Make sure the RUN/TOW Switch is in the TOW position.**
- **Make sure to Disconnect the Main Positive ⊕ and ⊖ Negative Cable on the Vehicle's Battery System.**

Before removing the original Controller take note or take a photo of the 5 Controller Terminals and their corresponding Wires. Make sure that the groups of wires stay together.
Remove (A) the Original Vehicle Controller. (B) Install the Controller using the 3 screws from the original controller.
CAUTION: DO NOT CONNECT ANY WIRES OR CABLES UNTIL AFTER STEP C.



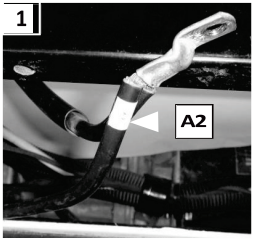


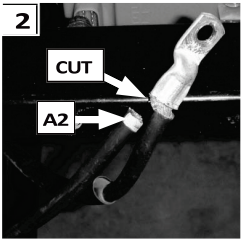
Locate (C) the Y cable on the Vehicle Harness: shown as A2 in the photo below. This cable consists of 2 cables crimped together into a Ring Terminal. The one side comes from the Battery Negative and the other side comes from the A2 on the Motor. Use a pair of side cutters to cut the A2 side of the cable at the Ring Terminal. Then crimp on a new ring terminal (included in the Harness bag). NOTE: The Ring Terminals on the original Harness may need to be drilled out to 5/16" to allow the New Harness to be connected to the new Controller.

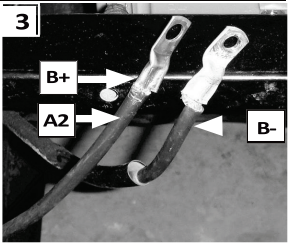
Torque Specifications

F1 & F2	**6 mm Bolt**	60 in-lbs/ 5ftlbs/ 6.8Nm
B-/M/B+	**8 mm Bolt**	150 in-lbs/ 12.5ftlbs/ 16.9Nm

C







SEE PHOTO ON FOLLOWING PAGE

(D) Connect the Motor Cable (usually white) from the original Controller to the M Terminals on the Controller using a M8 Bolt, Lock Washer and Flat Washer.

(E) Connect the Main Positive Red Power Cable from the Vehicle Solenoid and the Black A2 Cable (Cable that was cut and has the New Ring Terminal) to the B+ Terminals on the Controller using a M8 Bolt, Lock Washer and Flat Washer.

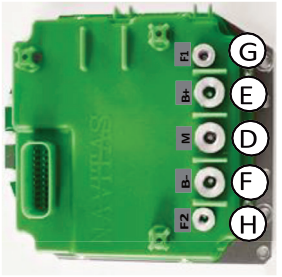
(F) Connect the Main Negative Black Power Cable (Cable from the Battery with the original Ring Terminal) to the B- Terminal on the Controller using a M8 Bolt, Lock Washer and Flat Washer.

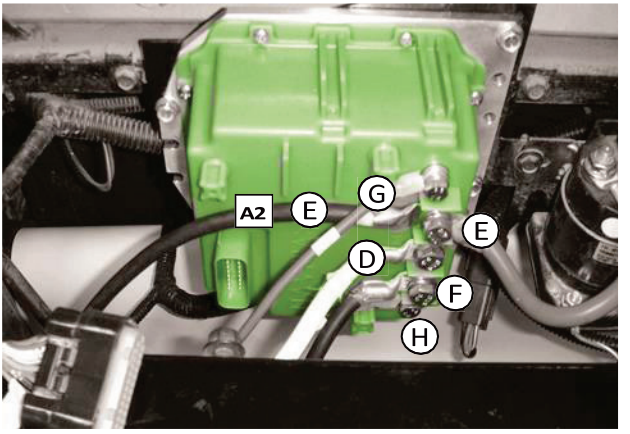
(G) Install the F1 Field Wire (usually green) from the original Controller to the F1 Terminal on the Controller using a Spade Connector.

(H) Install the F2 Field Wire (usually black) from the original Controller to the F2 Terminal on the Controller Terminal using a Spade Connector.

INSTALLATION INSTRUCTIONS

Yamaha Drive with Moric JW2 Installation cont'd.

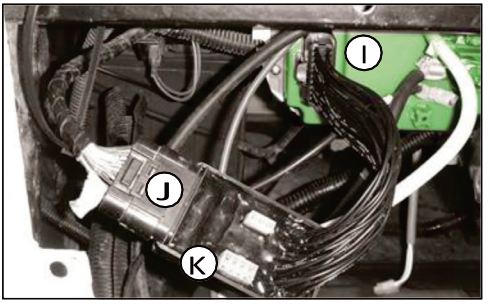




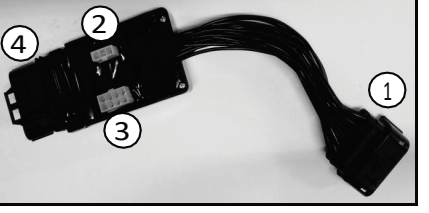
(I) Install the 20 Pin Connector on the Vehicle Module Harness to the Controller.

(J) Install the 26 PIN Connector from the Vehicle Wiring Harness to the 26 Pin Connector on the NAVITAS Vehicle Module Harness.

(K) This 8 Pin Connector is for the optional OTF "On The Fly" Programmer.



NOTE: The Harness should be oriented and secured with ZipTies so that water and debris does not accumulate in the Connectors.

Connector Plug Location				Vehicle Module Harness (Yamaha DR.)
1	**Controller**	**20 Pin**	Controller Harness Connector	
2	**Reserved**	**3 Pin**	NOT USED	
3	**OTF**	**8 Pin**	"On The Fly" Programmer *(Optional) Not included	
4	**Vehicle**	**26 Pin**	Vehicle Harness Connector	

Now the Vehicle's Main Battery Positive and Negative Cables can be re-connected.

INSTALLATION INSTRUCTIONS

CPC/CVG (SEVCON) Installation

DANGER

- Make sure the RUN/TOW Switch is in the TOW position.
- Make sure to Disconnect the Main Positive ⊕ and ⊖ Negative Cable on the Vehicle's Battery System.

Before removing the original Controller take note or take a photo of the 5 Controller Terminals and their corresponding Wires. Make sure that the groups of wires stay together.

Wire Connections

1. (F2) wire from F1/S1 on motor
2. (B-) wire from battery main negative (-)
3. (M) wire from A2 on motor
4. (B+) wire from solenoid - main positive (+), & wire from A1 on motor
5. (F1) WIRE FROM F2/S2 ON MOTOR
6. If it goes backwards, reverse the F1 & F2

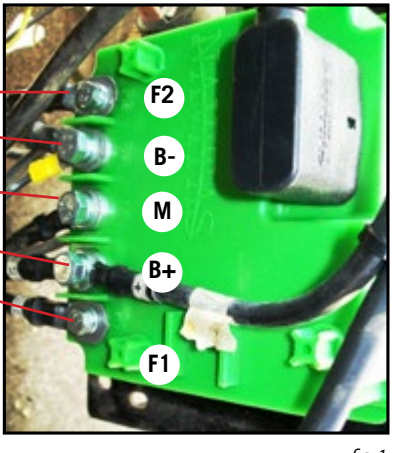


fig. 1

Overhead view showing Module Harness in place

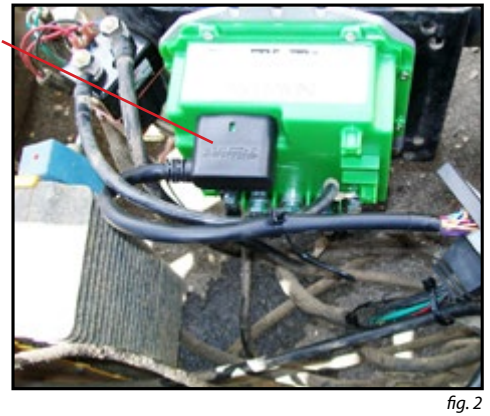


fig. 2

Torque Specifications

F1 & F2	**6 mm Bolt**	60 in-lbs/ 5ftlbs/ 6.8Nm
B-/M/B+	**8 mm Bolt**	150 in-lbs/ 12.5ftlbs/ 16.9Nm

INSTALLATION INSTRUCTIONS

CPC/CVG (SEVCON) Installation Cont'd

7. Install the 20 Pin Connector (*fig 3 & 4*, A) on the Navitas Vehicle Module Harness to TSX Controller
8. Install the 16 Pin OEM Connector (*fig 3 & 4*, B) to the Navitas Vehicle 23 Pin Module Harness
9. Optional - connect 8 pin connector (*fig 3 & 4* C) to the "On The Fly" Programmer).

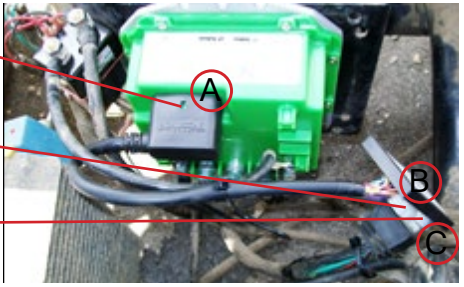


fig. 3

NOTE: The harness should be oriented and secured with Zip Ties to prevent water and debris from accumulating in the connectors

Vehicle Module Harness

fig. 4

A. 20 Pin Connector
B. 16 Pin OEM Connector
C. 8 pin connector

The Vehicle's Main Battery Positive and Negative Cables can now be re-connected.

INSTALLATION INSTRUCTIONS

OTF "On the Fly" Programmer (Optional)

DANGER FAILURE to follow the WARNINGS below can damage the Vehicle and/or cause SERIOUS INJURY OR DEATH!

By unlocking the programmer with the key, and adjusting the top speed, acceleration and electronic braking, the user has changed the operating behavior of the vehicle.

The user takes full responsibility when the OTF Programmer is unlocked and changes are made from the Factory Settings.

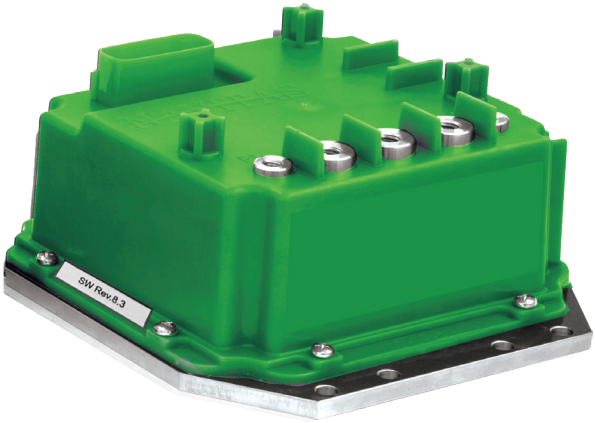
PART #10-000686
OTF 1.0 Programmer
(3.75 m Cable)

OTF 1.0 Cable connects to the 8 Pin Connector on the Controller harness

To install The OTF "On the Fly" Programmer

- First make sure the Vehicle RUN/TOW Switch is in the TOW position and the Key is turned off.
- The OTF can be mounted on the Vehicle or removed and used as required for programming purposes.
- The OTF has a long enough Cable to allow it to be mounted to the Dash area. Make sure to run the Cable in an area where it cannot get pinched, damaged or wet. i.e. Under the Floor Mat in the wiring channel. Use the Velcro provided to secure it to an open area on the Dash.
- Plug the end of the OTF in to the 8 Pin connector on the Harness.

NAVITAS SERIES 440A-600A / 36-48V
DC MOTOR CONTROLLER
Installation Manual



Instructions for:
Club Car SERIES (Resistive Throttle)
E-Z-GO SERIES (Inductive Throttle)

MAKE SURE TO READ and FOLLOW these Instructions & the Controller Installation & Service Manual Instructions when installing and operating this Controller and Vehicle!

NAVITAS

CONTROLLER MOUNTING

SERIES Install Locations

DANGER

- **Make sure to Disconnect the Main Positive ⊖ and ⊕ Negative Cable on the Vehicle's Battery System.**

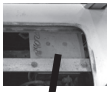
Before removing the Controller take a photo or note the Wiring Layout on the Original Controller.
Make sure that the groups of wires stay together.

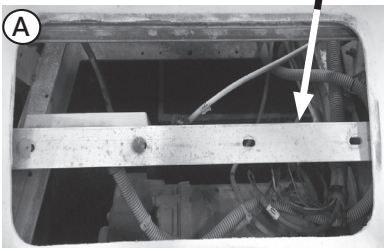
(A) Remove the Bolts holding in the original Controller.

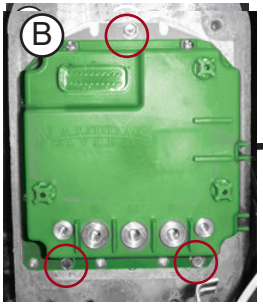
(B) Install the New Controller using the original Bolts and/or the Self Tapping Screws included.

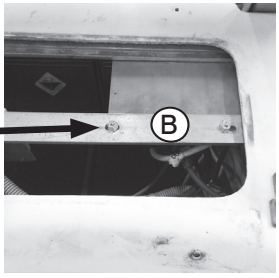
MAKE SURE THE CONTROLLER IS SECURELY MOUNTED!

Install Location 1
Horizontal Mounting
(Club Car)



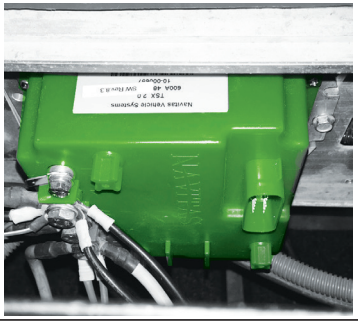


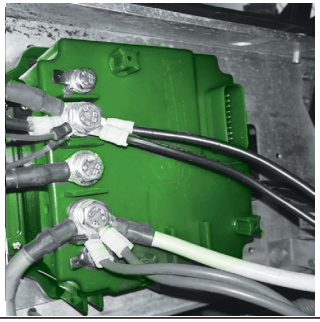




Install Location 2
Vertical Mounting
(Club Car)

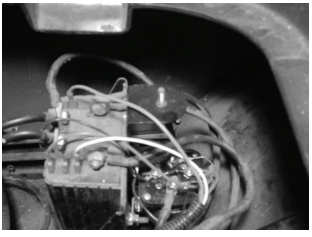
Note: If old controller had A2 bar. Remove that wire from the cart.





Install Location 3
Vertical Mounting
(E-Z-GO)

Note: If old controller had A2 bar. Bolt both wires together and wrap with tape or shrink tubing.



CONTROLLER WIRING

Club Car DS SERIES (Resistive Throttle) Installation

Note: Car must use a diode.

(A) to (D) see page 25.

(E) Connect the Terminal Wires as shown in the chart and photo below for numbers **1 to 3 and CN1 to CN3.** NOTE: CN4 & 5 are not required.

(F) Connect the 20 Pin to 20 Pin Plug Connector to the Controller and then to the Harness (Connector #1). Make sure to align the locking hole on the Controller side and the locking clip on the Harness side. GENTLY push this connector in to place on both sides.

(G) Connect the 10 Pin OTF Connector to the Harness (#2*). NOTE: The OTF is optional.

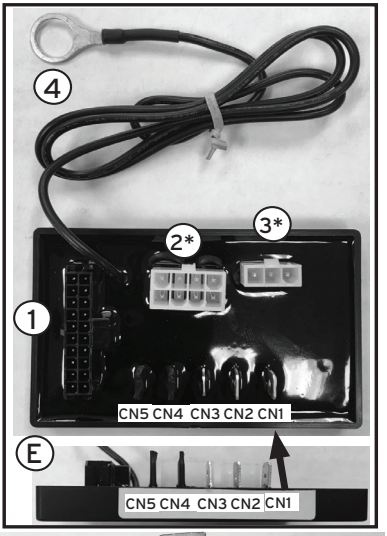
(H) Re-attach the Vehicle's Main Battery Positive and Negative Cables.

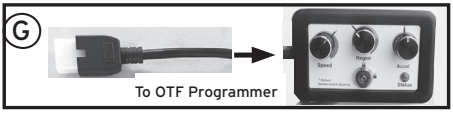
Tip: Alternatively Connect 4 to the keyswitch to shut down controller when key is off.

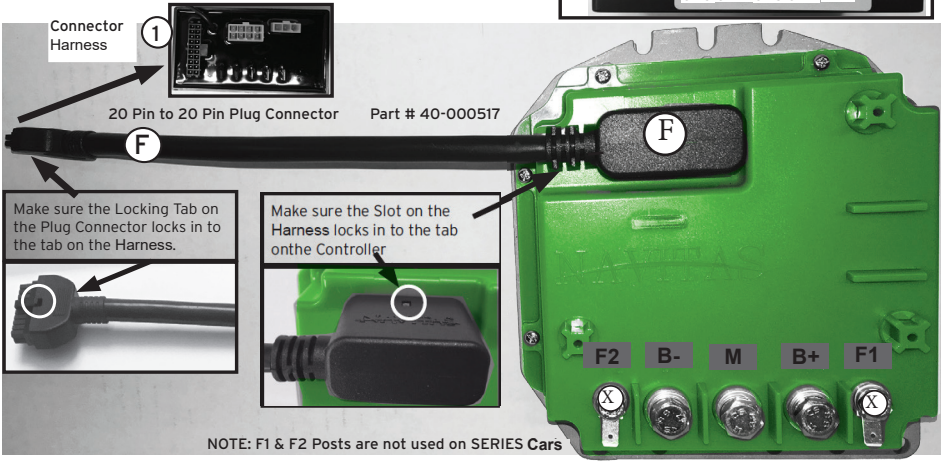
Connector Plug & Terminal Wire Location

1	Vehicle	20 Pin	Plug Connector from Controller
2	OTF	8 Pin	"On The Fly" Programmer *(Not included)
3	Reserved	3 Pin	Not Used
4	Vehicle	Ring Terminal	Attach to the Battery side of the Solenoid (Large Post)
CN1	Vehicle	Terminal	Key (usually Red)
CN2	Vehicle	Terminal	+5V (usually Green)
CN3	Vehicle	Terminal	Throttle (usually Yellow)
CN4	Vehicle	Terminal	Throttle GND (Not required)
CN5	Vehicle	Terminal	REV Input (Not required)

Harness Part # 10-000666







CONTROLLER WIRING

E-Z-GO SERIES (Inductive Throttle) Installation

(A) to (D) see page25. **Note: Car must use a diode.**

(E) Connect the Terminal Wires as shown in the chart and photo below for numbers **1 to 3, 5 and CN1 to CN3**. NOTE: CN4 & 5 are not required.

(F) Connect the 20 Pin to 20 Pin Plug Connector to the Controller and then to the Harness (Connector #1). Make sure to align the locking hole on the Controller side and the locking clip on the Harness side. GENTLY push this connector in to place on both sides.

(G) Connect the 10 Pin OTF Plug Connector to the Harness (# 2*). NOTE: The OTF is optional.

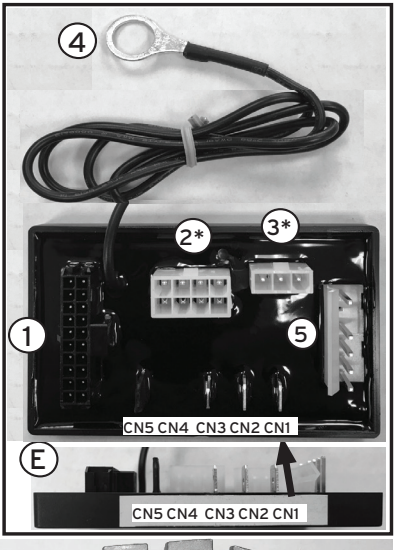
(H) Re-attach the Vehicle's Main Battery Positive and Negative Cables.

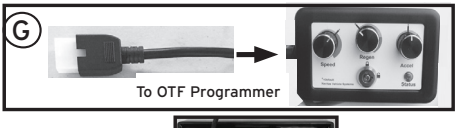
Tip: Alternatively Connect 4 to the keyswitch to shut down controller when key is off.

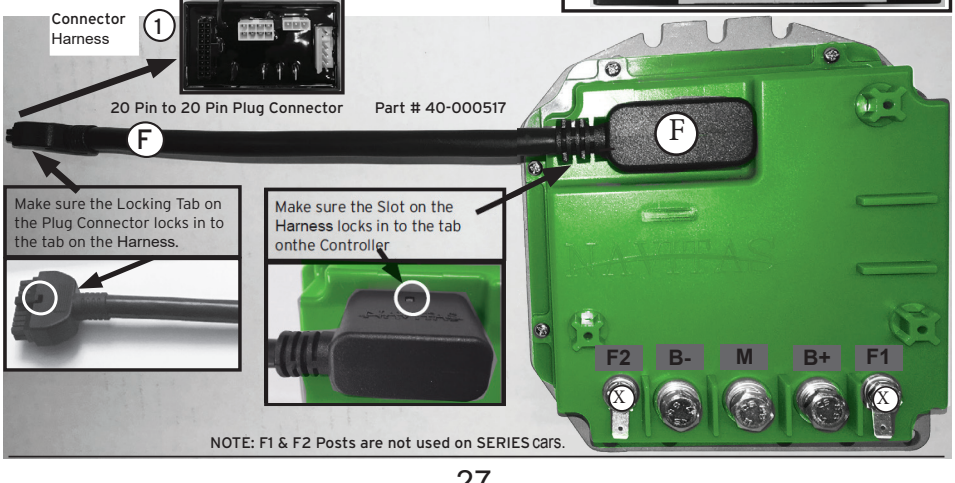
Connector Plug & Terminal Wire Location

1	Vehicle	20 Pin	Plug Connector from Controller
2	OTF	8 Pin	"On The Fly" Programmer *(Not included)
3	Reserved	3 Pin	Not Used
4	Vehicle	Ring Terminal	Attach to the Battery side of the Solenoid (Large Post)
5	Vehicle	6 Pin	Alternative TXT Connector
CN1	Vehicle	Terminal	Key
CN2	Vehicle	Terminal	GND (usually White)
CN3	Vehicle	Terminal	Throttle (usually Black)
CN5	Vehicle	Terminal	REV Input (Not required)

Harness Part # 10-000667

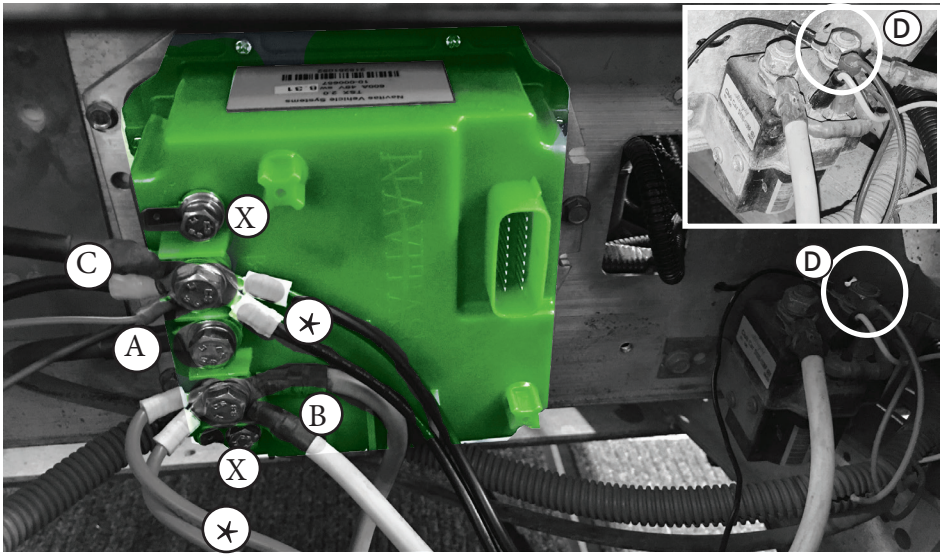






INSTALLATION INSTRUCTIONS

SERIES Club Car & E-Z-GO Installation



Note: Car must use a diode.

(A) Connect the Motor Cable (M) from the original Controller to the M Post on the Controller using a M8 Bolt, Lock Washer and Flat Washer.
(B) Connect the Main Positive Power Cables from the Original Controller to the B+ Post on the New Controller using a M8 Bolt, Lock Washer and Flat Washer.

Note * This photo shows the 4 4WD Battery Power Cables installed. They are for a previous 4WD Kit and now discontinued.

(C) Connect the Main Negative Power Cables from the Original Controller to the B- Post on the New Controller using a M8 Bolt, Lock Washer and Flat Washer.
(X) The F1 and F2 Posts are not used on this Vehicle.
(D) Connect the Ring Terminal from the Harness (#4 On previous page) to the Battery side of the Solenoid.

For the next steps see page 22 for Club Car, and 23 for E-Z-GO.

Torque Specifications

F1 & F2	**6 mm Bolt**	60 in-lbs/ 5ftlbs/ 6.8Nm
B-/M/B+	**8 mm Bolt**	150 in-lbs/ 12.5ftlbs/ 16.9Nm

Note when replacing controllers with an A2 terminal:
• If there is one wire on the A2, follow it back and remove it from the vehicle. You do not need this wire.

• If it has two wires on the A2, bolt the 2 wires together and wrap them up. Or alternatively, remove both wires and replace them with a single wire between the F/R and the motor.

CONTROLLER TEST INSTRUCTIONS

Controller Pre-Drive Test:

⚠ CAUTION: All Drive Wheels MUST be off the ground!

1. **Move the Run/Tow Switch to the Run position.**
2. **Insert and turn Key to ON**
3. **Move Vehicle's FNR switch to the Forward position.**

⚠ Caution: the F1 and F2 Wires could be reversed do to Vehicle Wiring and may cause the vehicle to move in the opposite direction as shown on the Switch.

4. **Step on the Accelerator to test that the Vehicle is operating. Repeat this test with the switch in the Reverse position.**
5. **If vehicle direction is backwards, swap F1 & F2 at motor or contoller.**

If the Rear Wheels of the vehicle are not running properly during the Pre-Drive Test see the chart below to test the Vehicle Switches.
NOTE: On the OTF the LED will flash once when the Key, Forward, Reverse, or Foot Switch is activated and at 100%

The following test procedures are to show that the Controller is getting the correct signals.
If an OTF Programmer was not purchased, the Vehicle's Reverse Buzzer will beep (if it is connected) and this can be used for the test procedures.

CONTROLLER INPUT SIGNAL CHECK

TEST		ACTION	RESULT	YES	NO
1	Key Switch	Turn Key Switch to ON	1 Green Flash/ Beep	OK	Replace Key Switch
2	Forward	Move Switch to Forward	1 Green Flash/ Beep	OK	Replace FNR Switch
3	Reverse	Move Switch to Reverse	1 Green Flash/ Beep	OK	Replace FNR Switch
4	Foot Switch	Slowly depress the Accelerator	1 Green Flash/ Beep	OK	Replace Throttle Sensor/ or Throttle
5	100% Throttle	Continue to depress Accelerator to Floor.	1 Green Flash/ Beep	OK	Replace Throttle Sensor/ or Throttle

Controller Drive Test:

⚠ Caution: Before taking the Vehicle for the "Final Run Test" check for any loose wires or parts that could get caught or damaged.

This test will show that the Controller is installed and running correctly.

BEFORE YOU RUN THE FINAL TEST COMPLETE THE FOLLOWING STEPS:

1. Lift the Vehicle to allow the Jack Stands to be removed and the Vehicle to be lowered back to the ground.
2. Make sure the area around the Vehicle is clear; No people, children, pets, or objects that could come in contact with the Vehicle.
3. Move the Run/Tow Switch to Run
4. Turn the Key to Run and dis-engage the Parking Brake
5. Drive the Vehicle to an open area. Slowly Accelerate allowing time to get use to the extra power.

TROUBLESHOOTING for SHUNT or SERIES

NON-FLASH CODE TROUBLESHOOTING

Note: The list below shows some possible issues when the Controller does not show a Flash Code Error. These issues are often related to the Vehicle. Always check the Manufacturers Service Manual - and refer to the Bluetooth App.

SOLID GREEN LIGHT IS **OFF** ○ * This means the Controller is NOT getting power (SERIES) or is in Sleep Mode (SHUNT). See Bluetooth App.

ISSUE	CAUSE	HOW TO CHECK
No Solid Green Light on the Controller	• Check the wiring to the Controller and Solenoid	• Is the Black wire with Ring Terminal connected to the Battery + Positive side of the Solenoid. • Check that all the wiring connections to the Controller are correct and tight. • Disconnect the CN1 to CN5 wires on the Harness and check for Solid Green Light. IF Yes Check wiring connections by reinstalling one at a time.

SOLID GREEN LIGHT IS **ON** ● * This means the Controller is getting power.

ISSUE	CAUSE	HOW TO CHECK
Vehicle / Motor not moving	• Faulty Foot Switch on the Throttle • Faulty Key Switch • Faulty Micro Switches on Directional Selector	• With Key ON and Direction Selector in Forward measure the voltage between PIN CN1 and Battery Negative B-. Should see battery voltage when Throttle is pressed and OV when released. • If Not: check Key Switch, Micro Switches and Foot Switch.
	• Faulty Throttle	• Measure Pin 2 of the Connector on the Harness to Battery Negative B-. Should see 0-5V that varies with Throttle position. (Series module does the translation from ITS throttle to 0-5V)
	• Faulty Directional Selector	• With Key ON and Directional Selector in Forward measure the voltage between the B+ and M on the Controller while depressing the Throttle. The voltage should vary with the Throttle. • If the voltage at B+ and M changes and the wheels do not turn check the Directional Selector by performing a Continuity Test
	• Faulty Motor	• Do Low Voltage Motor Check.
Vehicle is moving Slowly	• OTF Programmer is set too Low	• Make sure the OTF is Unlocked and adjust the Speed Knob to a higher setting.
	• Faulty Throttle	• Calibrate the Throttle (see Configuration Instructions above)
	• Selector Switch stuck in Reverse	• Check Reverse Micro Switch.

TROUBLESHOOTING

DANGER Failure to follow the Warnings in this Manual can damage the Vehicle and/or cause SERIOUS INJURY OR DEATH.
Service of the Controller Must be done by a trained golf car technician.

Before troubleshooting the Controller;

- Make sure the Run/Tow Switch is in the Tow position
- The Key is turned OFF
- Make sure ALL drive wheels are off the ground and the vehicle is supported with jack stands.
- The Controller is sealed and cannot be opened for service. Opening the Controller will Void the Warranty

PRELIMINARY TROUBLESHOOTING – See Bluetooth App

Tools Required:

Digital Multimeter

Harness Connector

This Connector is part of the Harness that is attached to the Controller.

ISSUE	POSSIBLE CAUSES	HOW TO CHECK
Vehicle/ Controller does not power up.	• RUN/TOW off.	• RUN/TOW Switch in RUN position.
	• Discharged/ Bad Batteries	• Check Battery Pack voltage (It needs to be at least 31V to power up)
	• Wiring and Connectors	• Check All Wires for damage or loose connections.
		• Check that the pins are fully seated in the Connectors (by tugging lightly on the individual wires) and that the Connectors are fully seated and locked into place.
	• Correct voltage at Controller	• Check the voltage at the Controller between B+ and B- (it should be the pack voltage).
		• Check the voltage between Pin 10 of the Vehicle Module Harness's 20 Pin Connector and the B-. (It should be pack voltage).
	• Faulty Harness	• Replace Harness

If there is pack voltage at the Controller between B+, Pin 10 and B- replace the Controller and re-test.

FLASH CODE TROUBLESHOOTING – See Bluetooth App

This Controller has both a **GREEN LED** and a **RED LED Status Light** that will indicate the status of the Controller.
It is located inside the Controller and is visible through the Top Cover when the Controller is powered.
Note: The vehicle's reverse buzzer will also chirp the flash code in the event of a fault.
Note: If the Optional "On the Fly" Programmer was purchased it is also equipped with a **GREEN LED Status Light**. This light will indicate the same Flash Codes except they will be in **GREEN** only.

LED STATUS LIGHT CHART ● = SOLID ✺ = FLASHING

GREEN LED

	GREEN	VEHICLE STATE	MODE	STATUS	
*	✺ x2	KEY OFF	Standby	☑	Turn Key ON
	●	KEY ON	Ready	☑	Ready to use!

*Controller will enter sleep mode if key is off.
Light will flash 2x for 5 cycles before going to sleep.

RED LED

RED	VEHICLE STATE	MODE	STATUS
✺	See Flash Code Chart Next Page	Error	[X] Fault!

RED LED Status Light contains a 2 digit code;

EXAMPLE: ✺ 1 SEC ✺ ✺ = 1 - 2 Flash Code

NOTE: There will be a 2 second pause before the error code repeats itself.

TROUBLESHOOTING – See Bluetooth App

FLASH CODES	FLASH CODE MESSAGE	DESCRIPTION	SOLUTION	HOW TO CHECK
1-1	**Voltage Issue: Batteries**	Batteries are empty or too low.	• Recharge Batteries • Check for bad or damaged batteries • Check Battery Cables are not loose or damaged. • Check Solenoid	• Use Battery Load Tester to verify battery conditon after charging. • Connect Volt Meter to Main + and - on batteries. (Use alligator clips). Measure the voltage while dirving to see if voltage drops. • Attach Volt Meter to the + and - on the controller. if the voltage drops at the Controller but not the battery then the solenoid might be bad. • Use a Battery Load Tester to verify the battery condition after charging.
1-1	**Voltage Issue: Batteries**	Batteries too full	•Batteries cannot take a charge. Check the batteries, one or more may be bad	
1-1	**Voltage Issue: Solenoid (Contactor)**	Damaged Solenoid or loose wiring	• Confirm the solenoid is working properly. Change solenoid if needed.	•Put vehicle in Neutral. Measure voltage on main terminals (high current connections) of the solenoid. Depress throttle and listen for solenoiod to click. If solenoid clicks and the voltage does not drop to 0v between the main terminals, replace solenoid. • If solenoid does not click, measure the voltage across the small termials of the solenoid when the throttle is depressed. It should read battery voltage. If it reads the battery voltage the solenoid is bad. If it does not ready the battery voltage check vehicle wiring.
1-2	**Temperature (Controller)**	Performance is limited because the controller is hot	• Let vehicle cool off, system is overworked	• Check temperature of the controller with a non- contact temperature sensor
1-3	**Charger Interlock**	Charger is connected Vehicle charging port may be wet or bad Club Car OnBoard Computer (OBC) is in sleep mode or bad	• Disconnect the Charger • Dry and clean the charger port * Depress the throttle twice to wake up the OBC * Replace Charger port on vehicle	
1-4	**Temperature (Controller)**	Performance is limited because the motor is hot	• Let vehicle cool off, system is overworked	• Check temperature of the motor with a non- contact temperature sensor
1-5	**BDI (Battery Discharge Indication)**	The battery level is less than 20% SOC (State of Charge)	• Charge batteries	• The vehicle will automatically be put into Low Speed Mode **Warning! Continued use may damage the batteries!**

TROUBLESHOOTING – See Bluetooth App

FLASH CODES	FLASH CODE MESSAGE	DESCRIPTION	SOLUTION	HOW TO CHECK
2-1	**Switch Fault**	Both the FWD & REV signal came on at the same time	• Check and replace FWD & REV switch	• Check for loose wires. If there is a diode across the small terminals, check at it is installed correctly and not shorted.
2-2	**Solenoid (Contactor)**	Solenoid colil is pulling too much current	• Check for loose wires or a short across the small terminals on the solenoid. • Replace solenoid.	• Check for loose wires. If there is a diode across the small terminals, check at it is installed correctly and not shorted. • Test solenoid by measuring the resistance across the small terminals of the solenoid. The resistance should be grater than 48 OHMS.
2-3	**Reverse Buzzer / OTF LED**	Over Current on the Reverse Buzzer / OTF LED circuit.	• Find and corect the short circuit. • Replace reverse buzzer • Replace OTF	• Unplug OTF and check if Flash Code Error stops on the controller • Check for a short circuit in the wiring near the reverse buzzer on in the buzzer itself.
2-4	**Controller not Pre-charging**	Abnormally low voltage on the controller between B+ and B- Cables/Connector	• Clean and dry off controller • Check voltage • Check all the wires are connected to the controller • Test Cables at the Controller. **<u>DO NOT</u> replace the controller until all of the "HOW TO CHECK" diagnostics regarding Flash Code 2-4 have been completed and the motor has been tested for short circuits!**	• Visually check for debris or moisture on the controller terminals and wires. (There may be short acrss the B+ and B- terminals.) * Check the wires are not damaged • Check the B+ and the F1/F2 wires are not shorted to the frame or each other. (B+/F1, B+/F2, F1/F2) • Check that no accessories (Lights, stereos, etc) are using the frame as ground. • Remove all cables except B- from the controller.. • Tape cables so they do not touch each other or the vehicle frame. Controller harness should remain plugged into the controller. • Move Run/Tow Switch to Run, Turn on Keyswitch, depress the throttle. If 2-4 Flash Code returns, replace the controller. • Otherwise there is a wiring problem. Reconnect wires one at a time starting with the B+ (Turn off RUN/TOW switch each time) until 2-4 Flash Code returns. This will indicate source of wiring issue.
2-5	**Throttle Supply Failure**	+5V to the throttle is low	• Disconnect throttle from harness	• If error clears, then check throttle.
2-6	**Loss of Field Current**	Field current on the controller is 0A	• Check Field Cables	• Remove field cables from controller, measure across F1 and F2 in Forward with the throttle down. Should read battery pack voltage. Switch to Reverse, press throttle. Should read battery pack voltage. If either test fails, replace controller.

TROUBLESHOOTING – See Bluetooth App

FLASH CODES	FLASH CODE MESSAGE	DESCRIPTION	SOLUTION	HOW TO CHECK
2-8	**Field Shorted**	Short detected on field circuit	• Check to see if field wires are touching motor case.	• Check for shorts from F1 and F2 to Battery - and frame. • Disconnect F1 and F2 from controller. Turn on keyswitch and see if fault remains. If it doesn't, replace the motor.

NON-FLASH CODE TROUBLESHOOTING

NON-FLASH CODE ERRORS. Note: The list below shows some possible issues when the Controller does not show a Flash Code Error. These issues are mainly related to the Vehicle. Always check the Manufacturers Service Manual.

ISSUE	CAUSE	HOW TO CHECK
The Vehicle is moving slower than normal.	• Batteries are discharged • Bad or damaged Motor • Faulty Speed Sensor • Faulty Throttle • OTF programmer is locked at low speed	• Re-charge the Batteries • Check Motor • Unplug Speed Sensor • Raise the Vehicle so all wheels are off the ground. Depress Throttle and look for green flash on OTF Programmer when the Throttle is almost completely depressed. • Connect the OTF Programmer, unlock it and adjust to desired speed. Note: Lock OTF Programmer before removing it or the settings may change.
Vehicle is shutting down.	• Check Vehicle Wiring for loose connections • Check the OBC (On Board Computer)	• Check the OBC by referring to the "OBC section" in the manufacturers service manual.
Oscillations or bumpy feel when driving.	• Motor compatibility	• Check that the Motor is on the Navitas recommended Motors list
Vehicle feels sluggish after driving for a while.	• Battery Cables are undersized	• Upgrade the Power Cables to at least 4AWG.
Faulty Controller	• Controller malfunction	• Use a Digital Multimeter set to Diode mode ⟶| • Remove all Wires and Cables on Controller • Use "Controller Diode Test" Chart below to test the Controller

CONTROLLER DIODE TEST CHART

BLACK LEAD ⊖	RED LEAD ⊕	VOLTAGE	BLACK LEAD ⊖	RED LEAD ⊕	VOLTAGE ⟶|
B+	M	0.42V approx.	F2	B-	0.48V approx.
M	B-	0.42V approx.	B+	F1	0.48V approx.
F1	B-	0.48V approx.	B+	F2	0.48V approx.

ACCESSORIES

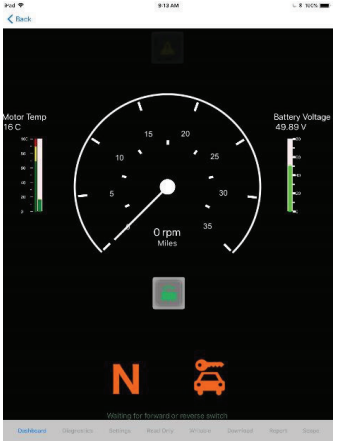
Bluetooth® Apps for TSX 3.0

BLUETOOTH APPS - for TSX 3.0 and Greater

Customer and Dealer App available for Android and Apple IOS:

IOS: https://itunes.apple.com/us/app/dashboard-navitas/id1248027444?mt=8&ign-mpt=uo%3D4

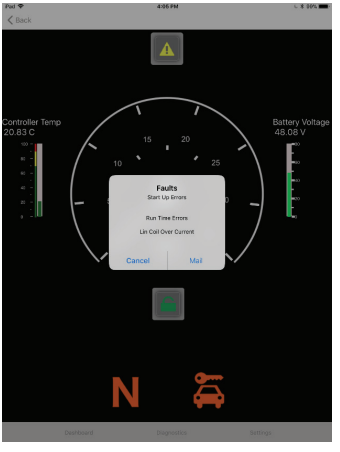
Android: https://play.google.com/store/apps/developer?id=Navitas+Vehicle+Systems+Ltd.



Free Bluetooth Driver App*

Features and Benefits

- Monitor "live" battery voltage level
- Battery watering reminder
- Bluetooth Lockout (lock the car out with one button)
- Use the App as a DISPLAY and make use of the built-in Speedometer
- Forward error diagnostics directly to your service technician/dealer for quick REMOTE diagnosis



Bluetooth Dealer App*

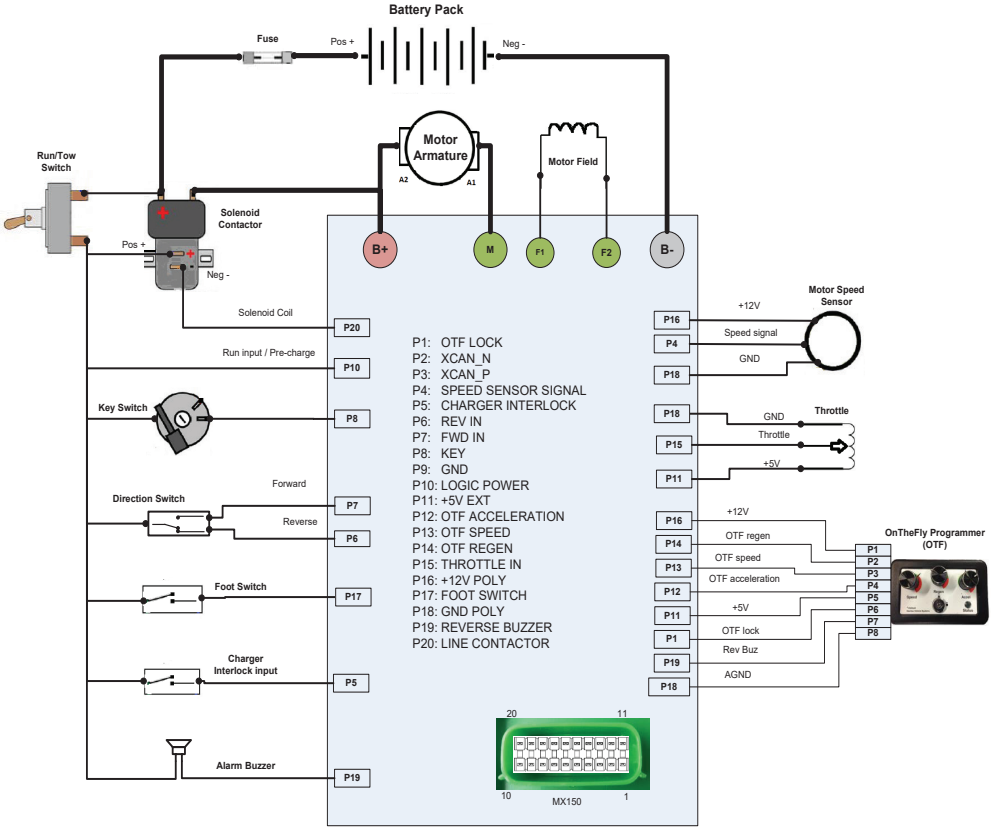
Visit www.navitasvs.com/contact to request access

Features and Benefits

- Customize your settings
- Tune car performance
- Limit/set top speed
- Activate OverDrive function
- Pick motor pre-configured for ultimate performance and efficiency, including overheating safeguards
- Troubleshoot **on site** with diagnostic reporting using any iOS or Android enabled device
- Technicians can also diagnose cars **remotely** via diagnostic car errors sent directly from customers via email
- Emails can also be forwarded **to NAVITAS** engineering department for additional support
- Upgrade Firmware with ease.

*Actual screen format and features may vary

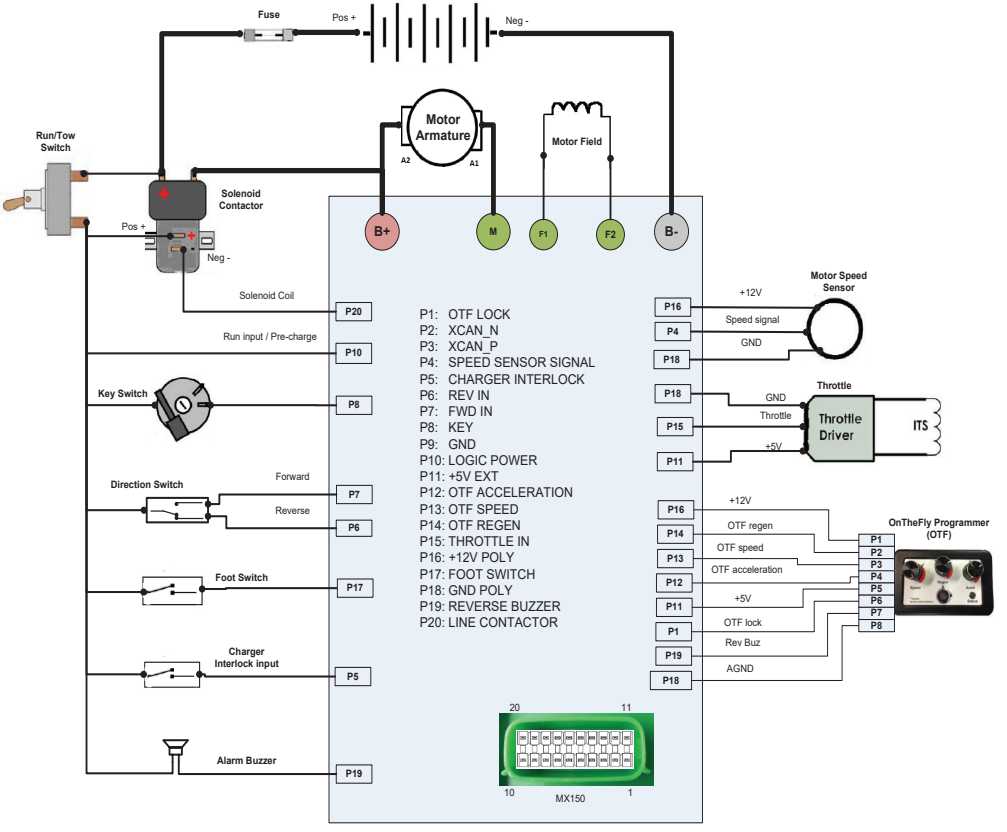
Pinout for Club Car IQ - SHUNT



Navitas TSX3.0 shunt motor controller

Wiring Harness Pinout Diagrams and other updates available at:
NavitasVS.com/support

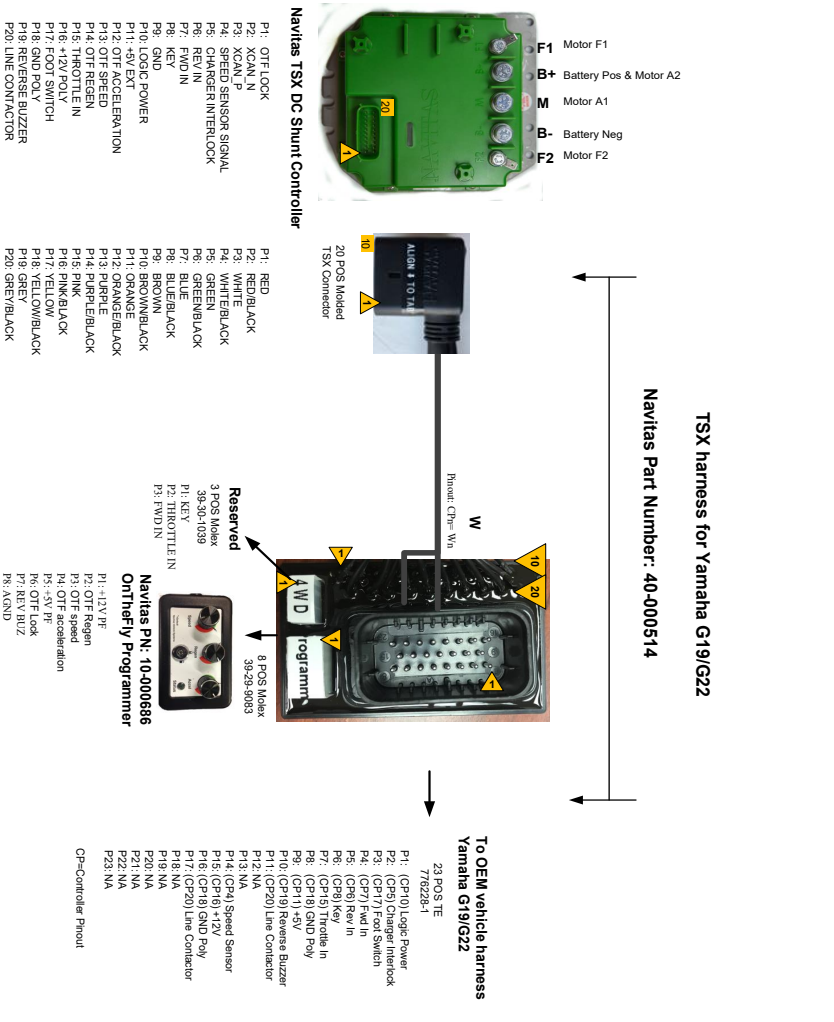
Pinout for E-Z-GO TXT - SHUNT



Navitas TSX3.0 shunt motor controller

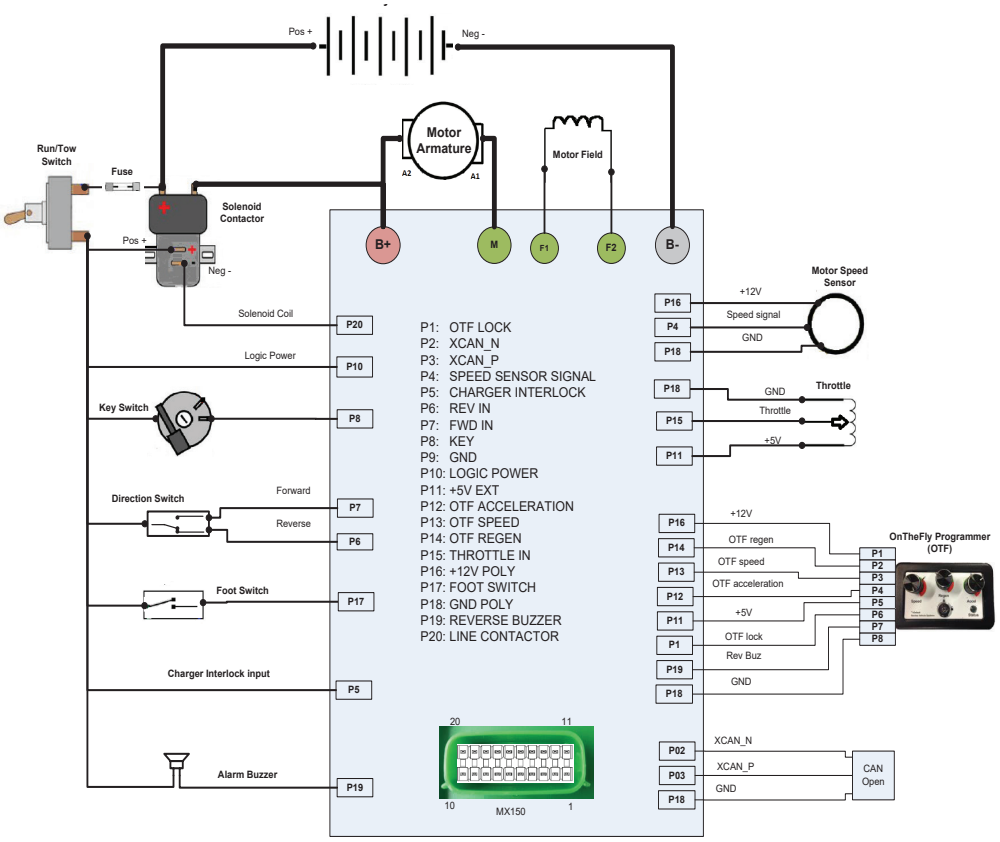
Wiring Harness Pinout Diagrams and other updates available at:
NavitasVS.com/support

Pinout for YAMAHA G19/22 (MORIC) Controller



Diagrams and other updates available at: **NavitasVS.com/support**

Pinout for Yamaha Drive - SHUNT



Navitas TSX3.0 shunt motor controller

Wiring Harness Pinout Diagrams and other updates available at:
NavitasVS.com/support

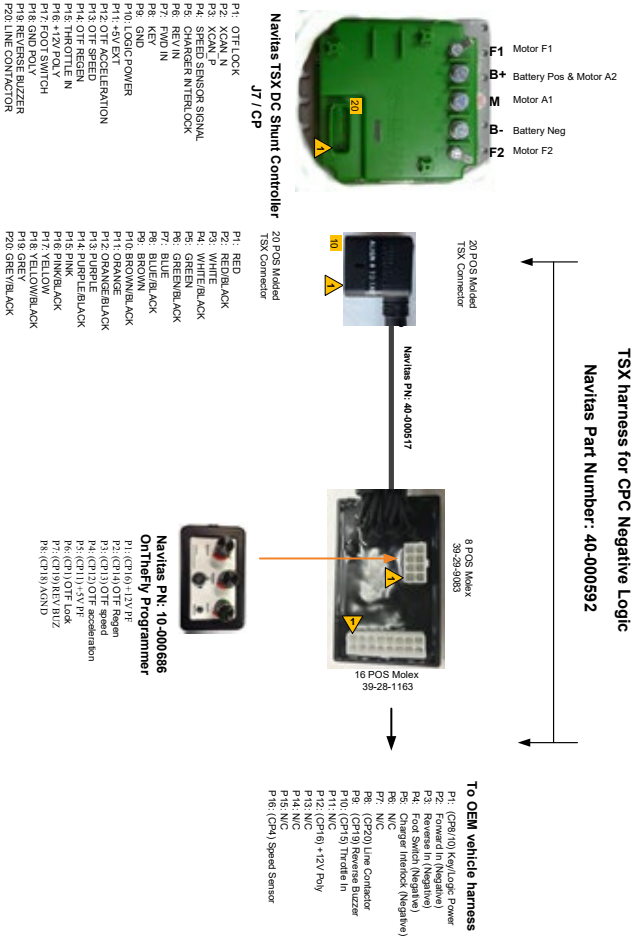
APPENDIX E

INSTALLATION/ SERVICE MANUAL

INSTALLATION INSTRUCTIONS

CPC/CVG (SEVCON) Installation Cont'd

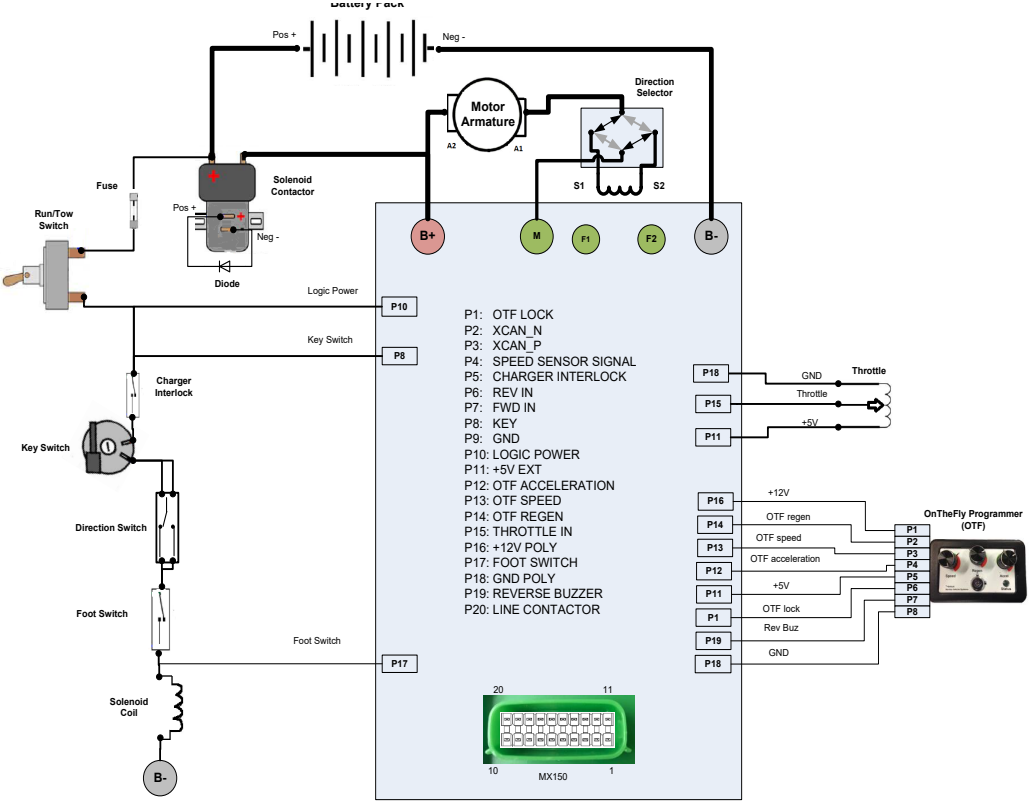
Pinout for Controller



Diagrams and other updates available at: **NavitasVS.com/support**

APPENDIX F

Pinout for Club Car - SERIES

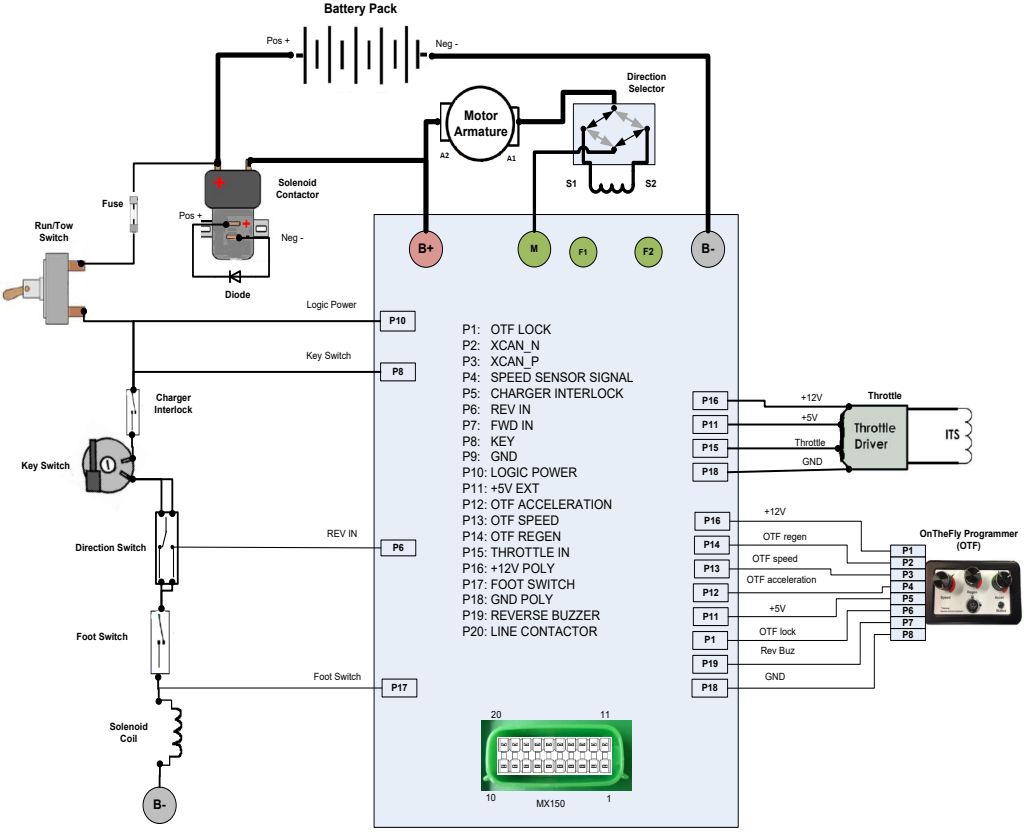


Navitas TSX3.0 shunt motor controller
(For Series Configuration)

Wiring Harness Pinout Diagrams and other updates available at:
NavitasVS.com/support

APPENDIX G

Pinout for E-Z-GO - SERIES



Navitas TSX3.0 shunt motor controller
(For Series Configuration)

Wiring Harness Pinout Diagrams and other updates available at:
NavitasVS.com/support

Warranty Document #05-000102

Navitas Vehicle Systems Ltd. warrants that the products sold to Customer by Navitas will be free from defect in materials and workmanship as noted below, from the date of manufacturing shipping of the product, subject to the terms and conditions in this Limited Warranty.

1. TSX, TSX2.0,TSX3.0, Separately Excited Models, TPM Permanent Magnet Models, TAC AC Induction Models – 24 months
2. TSE Series Models, PSE Hydraulic Models, CTL Series Models – Lessor of 12 months or 4,000 hours
3. MAC AC Motor – 12 months

If, during the applicable warranty period, (i) Navitas is advised in writing as to a defect in a Navitas product; (ii) such product is returned to a receiving point designated by Navitas; and (iii) an examination of such product discloses to Navitas' reasonable satisfaction that such product is defective and such defect was not caused by accident, abuse, neglect, alteration, improper installation, lightning damage, submersion, short circuits due to improper handling, repair, improper testing or use contrary to any instruction issued by Navitas, Navitas will repair or replace the defective product at no cost to Customer, except for transportation costs. Replacement shall mean furnishing the Customer with a new product equivalent to the defective product. All defective products replaced by Navitas under this warranty shall become the property of Navitas and must be returned to Navitas properly packed to prevent physical damage.

Navitas does not warrant that any product is suitable for use in any particular application. Customer shall be responsible for evaluating the appropriateness of the use of any specific Navitas product for a particular application. Navitas shall be entitled to rely exclusively upon such representation in furnishing any product to Customer.
TSX and TAC Products Application is for Golf Car and LSV Vehicles with speeds of up to of 25MPH. Users must comply with Federal, County and Municipal Bylaws & Regulations when operating vehicles.

Warranty Limitations

The foregoing warranty constitutes Navitas' exclusive Liability and the exclusive remedy of Customer for any breach of or any other nonconformity of the products covered by this warranty. This warranty is exclusive and in lieu of all other warranties. Navitas makes no warranty, expressed or implied or statutory including, without limitation, any warranty of merchantability or fitness for a particular purpose.

No representative, employee, distributor or dealer of Navitas has the authority to make or imply any warranty, representation, promise or agreement, which in any way varies the terms of this limited warranty.

The Navitas products sold to Customer are intended to be used only in the application specified by Customer to Navitas. Any other use renders the Limited Warranty expressed herein and all implied warranties null & void and same are hereby excluded. Under no circumstances shall Navitas be liable to Customer or any third party for consequential, incidental, indirect, exemplary, special or other damages whether in an action based on contract, tort (including negligence) or any other legal theory, arising out of or related to the products sold to Customer, including but not limited to lost profits or loss of business, even if Navitas is apprised of the likelihood of such damages occurring.

This limited warranty may not be changed, modified, limited or extended in scope except by a written agreement signed by Navitas and Customer. Except as stated, any purported modification of this limited warranty shall be null and void.

June 2019

Distributed by:

Navitas Vehicle Systems Ltd. (Navitas)

Waterloo, Ontario N2L 6A7 Canada

Wear Eye Protection!

Navitas Vehicle Systems Ltd.
500 Dotzert Crt.
Waterloo, ON Canada
N2L 6A7

Navitas Vehicle Systems (US) Ltd.
P.O BOX 691934 Orlando, FL
32869 United States

1-844-576-2499

NAVITAS

NavitasVS.com