

NAVITAS TAC 2

440A and 600A 48V-72V CONTROLLERS

for

AC INDUCTION MOTORS

Installation/Service Manual



INSTALLATION INSTRUCTIONS FOR:

E-Z-GO®RXV® 48V (CURTIS®)

E-Z-GO® RXV® 23 48V (DANAHER®)

E-Z-GO® TXT® 48V Conversion

CLUB CAR® Precedent® Conversion

YAMAHA® YDRE 2® (NEOS®)

YAMAHA® G29® Conversion (MORIC®)

NAVITAS

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BEST PRACTICES

Speed Control

- To maximize your vehicle's driving range only use the speed you need if using the OTF.
- Use the speed knob to control your maximum cruising speed, turn the speed down to the minimum practical speed necessary for the application. The controller significantly increases the operating efficiency 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.

Low Battery Warning

- When the battery discharged warning (1-5 flash) is given by the OTF (if present), 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.

Heavy Duty Usage

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

Warnings

- Always monitor the motor & battery wiring temperatures after changing the programmer settings (if OTF is present) – particularly when going to higher speeds
- If your battery pack is full, the amount of regenerative braking may be reduced since the controller has nowhere to put the excess energy.

INTRODUCTION

NAVITAS TAC 2 48-72V 440A / 600A Controller AC INDUCTION 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, labelling 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 #
RXV TAC 2 440A/600A 48-72V CONTROLLER with BT 10-000878-01/10-000880-01	
RXV23 TAC 2 440A/600A 48-72V CONTROLLER with BT 10-000878-02/10-000880-02	
TXT TAC 2 440A/600A 48-72V CONTROLLER with BT 10-000888-03/10-000890-03	
CLUB CAR TAC 2 440A/600A 48-72V CONTROLLER with BT 10-000888-02/10-000890-02	
YAMAHA YDRE TAC 2 440A/600A 48-72V CONTROLLER with BT 10-000888-01/10-000890-01	
YAMAHA G29 TAC 2 440A/600A 48-72V CONTROLLER with BT 10-000888-09/10-000890-09	

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.

Make sure to also Read, Understand, and follow the Vehicle's OWNER'S MANUAL and ALL INSTRUCTIONS and WARNING LABELS.

- Always proceed with caution. Keep speed low and do not drive faster than conditions permit. 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 manoeuvres 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.
-
- 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 (LSV) market application and may operate at speeds Up to 25 MPH. Factory settings on controller have been set using: 18 inch diameter tires, non-performance motor & up to 25 MPH limit with vehicle speed sensor installed.
 - Operators/Users of Navitas golf car and LSV equipped products must follow published golf car & LSV federal, state, county & municipal bylaws & regulations issued for your "use area". For operation/use beyond golf car & LSV regulations/guidelines, full liability is assumed by operators/users.
 - 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.

SAFETY WARNINGS, CONT'D

- 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.
- 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.



AC CONTROLLER PARTS LIST

Confirm that all parts listed below are with your kit before starting installation.
If you are missing parts please contact your local dealer.

AC Induction Kit-Curtis 1236 E-Z-GO RXV 10-000879-01		
PART DESCRIPTION	PART NUMBER	QTY
TAC 2 Controller 440A	10-000878-01	1
TAC 2 Controller 600A	10-000881-01	1
TAC 2 Module	40-000620	1
Cable for-RXV	40-000583	1

AC Induction Kit-Danaher E-Z-GO RXV23 10-000879-02		
PART DESCRIPTION	PART NUMBER	QTY
TAC 2 Controller 440A	10-000878-02	1
TAC 2 Controller 600A	10-000881-02	1
TAC 2 Module	40-000623	1
TAC RXV23 Mounting Plate Kit	20-001844	1
Hardware Mounting Kit	10-000843	1
Wiring for RXV23 resistor	40-000582	1

TAC-IQ PRECEDENT 10-000889-02		
PART DESCRIPTION	PART NUMBER	QTY
TAC 2 Controller 440A	10-000888-02	1
TAC 2 Controller 600A	10-000891-02	1
TAC 2 Module	40-000621	1
TAC IQ Mounting Plate Kit	20-001843	1
Hardware Mounting Kit	10-000845	1
AC Motor 4KW	10-000815	1
AC Motor Phase Cable	40-000584	1
Cable for TAC-TXT/IQ - Speed Sensor / Motor Temperature	40-000580	1

EZ-GO TXT 10-000889-03		
PART DESCRIPTION	PART NUMBER	QTY
TAC 2 Controller 440A	10-000888-03	1
TAC 2 Controller 600A	10-000891-03	1
TAC 2 Module	40-000622	1
TAC TXT Mounting Plate Kit	20-001843	1
Hardware Mounting Kit	10-000834	1
AC Motor 4KW (Navitas)	10-000816	1
AC Motor Phase Cable	40-000584	1
Cable for TAC-TXT/IQ - Speed Sensor / Motor Temperature	40-000580	1
Run/Tow Switch Mounting Plate	20-001603	1

AC CONTROLLER PARTS LIST CONT'D

AC Induction Kit - YAMAHA YDRE 2 - TOYOTA 10-000889-01		
PART DESCRIPTION	PART NUMBER	QTY
TAC 2 Controller 440A	10-000888-01	1
TAC 2 Controller 600A	10-000891-01	1
TAC 2 Module	40-000627	1
Mounting Plate Kit	20-001843	1
Battery Cable	40-000583	1
Hardware Mounting Kit	10-000833	1

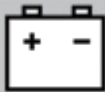
TAC 2 - YAMAHA G29 10-000889-09		
PART DESCRIPTION	PART NUMBER	QTY
TAC 2 Controller 440A	10-000888-09	1
TAC 2 Controller 600A	10-000891-09	1
TAC 2 Module	40-000632	1
Mounting Plate	20-001843	1
AC Motor Phase Cable	40-000584	1
Motor Sensor Cable	40-000580	1
4 KW AC Motor	10-000816	1
Ring Terminal for A2 Cable	40-000536	1
Hardware Mounting Kit	10-000833	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 / 600A 48-72V Controller must be done by a trained golf car technician. Before installing or servicing of the NAVITAS Controller:

- Disconnect the main (+) positive and (-) negative cable on the vehicle's battery system.
- 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 440A / 600A 48-72V 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.
- Remove pre-charge resistor from contactor and discard.

INSTALLATION INSTRUCTIONS

REQUIRED TOOLS & PARTS



REQUIRED TOOLS

- #3 Phillips screwdriver
- 10, 11, & 13mm wrench
- Socket driver w/ extension
- Wire cutters
- Assorted socket set
- Safety glasses
- Flashlight (optional)



Wear Eye Protection!

PURCHASED PARTS

- Controller w/ Bluetooth
- Mounting Plate w/ hardware
- On-The-Fly Programmer



ALL	6 mm Bolt	60 in-lbs/ 5 ft-lbs/ 6.8 Nm
Battery	5/16 Thread	90 in-lbs



CAUTION

Disconnect all batteries before beginning installation. If the car has a Run/Tow switch, you must place the switch in the TOW position first!

INSTALLATION INSTRUCTIONS

RXV Installation



CAUTION

Disconnect all batteries before beginning installation. If the car has a Run/Tow switch, you must place the switch in the TOW position first!

PARTS

- AC controller
- B+ cable (for solenoid to controller)
- On-The-Fly programmer



To view our Installation video for Golf Cars, visit: NavitasVS.com/support



1. Power down

- Turn off key, disconnect battery
- Put car on a stand and block wheels
- Use insulated tools
- Never use battery as workbench

2. Remove OEM Controller

- Remove OEM protective cover
- Remove the battery positive bus bar
- Remove resistor wires
- Remove battery negative cable
- Remove resistor cage with solenoid
- Unplug Harness
- Remove motor phase cables.
- Unbolt and remove the controller



Fig. 1

3. Install Navitas TAC 2 Controller

- Route motor cables to new controller around outside of controller mount
- Remove bolts, washer, lock washer from top of new controller.
- Fasten TAC 2 Controller to existing mounting bracket using original hardware (Fig. 2)



Fig. 2

INSTALLATION INSTRUCTIONS

RXV Installation Cont'd

4. Connect Navitas TAC 2 Controller (Fig. 3)

- Connect cables using bolts, washers and lock washers: U to U, V to V, W to W
- Fasten NEW battery positive cable (B+ from controller to solenoid)
- Re-fasten resistor cage with solenoid mounted on it.
- Add battery positive cable to solenoid and add black lead from resistor on top of battery cable and tighten w/13mm wrench or socket
- Tighten back positive terminal
- Add wire from the resistor to the “resistor output” of the controller and tighten w/10mm wrench or socket
- Connect battery negative cable - Tighten w/10mm wrench or socket.

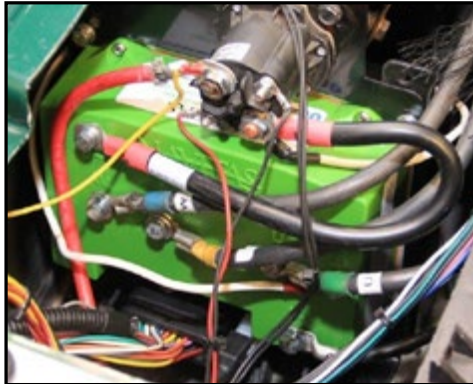


Fig. 3

5. Connect RXV OEM harness (Fig. 3)

- Insert RXV OEM harness into adaptor module
- The Programming end of the CURTIS harness will NOT be used
- Re-connect the cover.

6. Install On the Fly Programmer (Optional)

- Unclip the three nuts to remove cup holders
- Feed end of cable through body hole on the dash and leave enough slack to mount the OTF on the dash
- Mount on On-the-Fly programmer on the dash w/ Velcro strap
- Feed cable back through the channel to the floor and chase back following wiring harness to the Navitas adaptor module and connect it. Zip tie cable to the factory wiring harness
- Connect OTF programming end into the adaptor module, and connect original controller harness into adaptor module;
- Zip tie motor phase wires to resistor cage
- Original communication plug from OEM controller not used
- Re-Connect cover
- Mount OTF on the dash
- Re-power the system by Connecting battery connection.

7. Test installation

- Lift drive wheels off ground
- Reconnect battery pack
- Switch to Run mode
- Turn key to Forward
- Press on throttle to activate wheels.

INSTALLATION INSTRUCTIONS

RXV Installation Cont'd

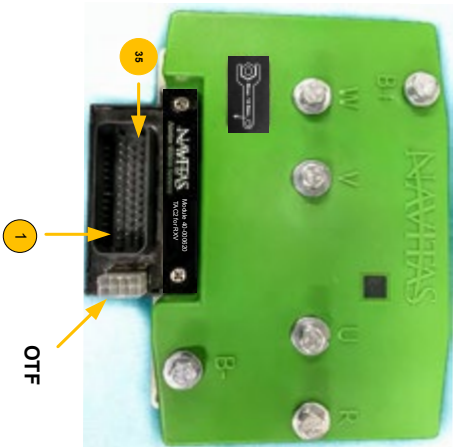
Pinout for Controller

**Navitas TAC2 AC Motor Controller
for RXV**
Product Model 10-000880-01 (440A)
10-000880-01 (600A)

Issue Date: 20181219

To OTF Programmer PN: 10-000686

- 8-POS Molex
- 39-28-1063
- P1: +12V PF
- P2: OTF Regen
- P3: OTF Speed
- P4: OTF acceleration
- P5: +5V PF
- P6: OTF Lock
- P7: OTF LED
- P8: Analog Ground



To OEM vehicle harness

35-POS Ampseal
1-776231-1

- | | |
|-------------------------------|---------------------|
| P1: Key In | P19:NA |
| P2: Reverse Buzzer | P20:NA |
| P3: NA | P21:NA |
| P4: Brake Light Relay Release | P22:Forward In |
| P5: Brake Solenoid Out | P23:CAN Positive |
| P6: Main Solenoid Out | P24:NA |
| P7: Logic Power GND | P25:+12V Output |
| P8: Motor Temperature In | P26:+5V PF |
| P9: Foot Switch In | P27:NA |
| P10:Tow Switch In | P28:NA |
| P11:Charger Interlock In | P29:NA |
| P12:Brake Switch In | P30:SOC Display Out |
| P13: NA | P31:SPD A In |
| P14: NA | P32:SPD B In |
| P15:+5V PF | P33:Reverse In |
| P16:Throttle In | P34:Analog Ground |
| P17:Brake In | P35:CAN Negative |
| P18:Analog GND | |

Diagrams and other updates available at:

NavitasVS.com/support

INSTALLATION INSTRUCTIONS

RXV 23 (Danaher) Installation



CAUTION

Disconnect all batteries before beginning installation. If the car has a run/tow switch, you must place the switch in the TOW position first!

Parts:

- AC Navitas controller with Bluetooth
- On-The-Fly programmer (optional)
- Mounting plate and hardware
- Resistor wire (longer for replacement)



To view our Installation video for Golf Cars, visit: NavitasVS.com/support



1. Power down

- Turn off key, disconnect battery
- Put car on a stand and block wheels
- Use insulated tools
- Never use battery as workbench

2. Remove OEM Controller

- Remove OEM Protective cover
- Remove solenoid (*Fig. 1*) - keep wires connected
- Remove resistor cage
- Remove motor phase cables and resistor cable, B- cable from controller
- Unclip Harness wires
- Remove plate (along with Danaher controller and black resistor module and wires)

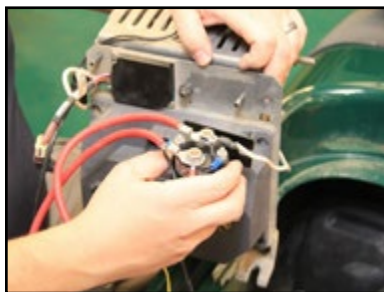


Fig. 1

3. Install New Mounting Plate (*Fig. 2*)

- Install plate in existing location using OEM hardware.



Fig. 2

INSTALLATION INSTRUCTIONS

RXV 23 (Danaher) Installation cont'd

4. Mount Controller (Fig. 3)

- Use supplied bolts / washers / lock washers
- Bolt plate from back side
- Connect harness at bottom



Fig. 3

5. Connect Controller

- Replace existing resistor cable (with NEW included longer resistor cable) to resistor output on controller
- Re-fasten resistor cage to the plate
- Re-fasten solenoid to the cage using 2 of the OEM bolts (Fig. 4)
- Connect battery B- cable from battery pack to controller
- Connect motor phase cables (U,V,W)
- Connect battery to B+ from solenoid



Fig. 4

6. Connect OEM Wire Harness (Fig. 5 & 6)

- Connect OEM wire harness to adaptor module

7. Install On-The-Fly Programmer (optional)

- Install OTF (optional) (see install description in RXV INSTALL instructions, p12)
- Connect OTF to Navitas adaptor module
- Zip Tie loose cables



Fig. 5

8. TESTING INSTALLATION

- Lift drive wheels off ground
- Reconnect battery pack
- Turn Key to Forward Position
- Press on Throttle to activate wheels

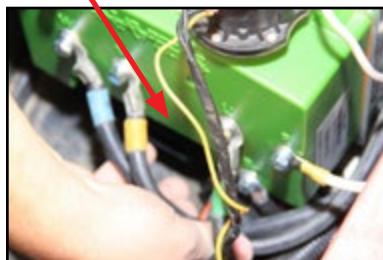


Fig. 6

INSTALLATION INSTRUCTIONS

RXV 23 (Danaher) Installation cont'd

Pinout for Controller

To OTF Programmer PN: 10-000686

- 8-POS Molex
39-28-1083
- P1: +12V PF
- P2: OTF Regen
- P3: OTF speed
- P4: OTF acceleration
- P5: +5V PF
- P6: OTF Lock
- P7: OTF LED
- P8: Analog Ground

**Navitas TAC2 AC Motor Controller
for EZ-GO RXV Danaher
Product Model 10-000880-01 (440A)
10-000880-02 (600A)**

Issue Date: 20181219



To OEM vehicle harness

- 23-POS Ampseal
776228-1
- P1: Key In
- P2: Brake Solenoid Out
- P3: +5V PF
- P4: A.GND
- P5: SPD A In
- P6: SPD B In
- P7: Brake In
- P8: NA
- P9: Throttle In
- P10: Reverse Buzzer Out
- P11: SOCC Display Out
- P12: Forward In
- P13: Tow Switch In
- P14: NA
- P15: NA
- P16: Motor Temperature In
- P17: Charger Interlock In
- P18: MAIN Solenoid Out
- P19: Foot Switch In
- P20: Reverse In
- P21: NA
- P22: Brake Light Relay Release
- P23: NA

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

INSTALLATION INSTRUCTIONS

E-Z-GO DC to AC Conversion

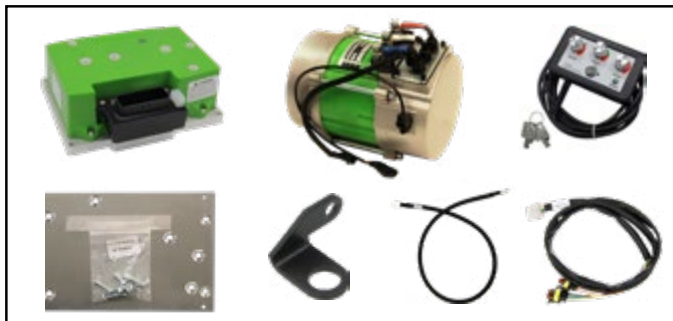


CAUTION

Disconnect all batteries before beginning installation. If the car has a run/tow switch, you must place the switch in the TOW position first!

PARTS INCLUDED

- AC Controller
- AC 4 kW motor
- On-The-Fly programmer (Optional)
- Mounting plate and hardware
- Run/Tow switch mount
- Motor phase cable
- Speed sensor/motor temperature harness



To view our Installation video for Golf Cars, visit: NavitasVS.com/support

1. Power down

- Turn off key, disconnect battery
- Put car on a stand and block wheels
- Use insulated tools
- Never use battery as workbench

2. Remove OEM Protective Cover

- Remove cables from controller
- Unclip OEM Wire Harness

3. Remove OEM Controller

4. Install TXT Mounting Plate

- Align plate with existing holes (where OEM controller was fastened) and fasten with screws (Fig. 2)



Fig. 1



Fig. 2

INSTALLATION INSTRUCTIONS

E-Z-GO DC to AC Conversion cont'd

5. Mount Controller

- Install Navitas AC controller (Fig. 3)
- Attach Run/Tow switch mount and fasten Run/Tow switch to mount.
- Connect B- from battery, B+ from solenoid and motor phase cables to U, V, W (use new cable provided as 'W' and re-use the 2 existing motor phase cables from A1=U, A2=V) to the controller (Fig. 5)



Fig. 3

6. Motor Conversion

- Remove motor phase cables A1, A2 from motor
- Remove and DISCARD field cables (F1, F2)
- Remove DC motor
- Install Navitas AC motor
- Connect new speed sensor/motor temp harness to motor (Fig. 4)
- Connect motor phase wires from controller (A1 =U, A2 = V and new cable = W) (Fig. 6)
- Check cabling to make sure U, V, and W match exactly from motor to controller (Fig. 6)



Fig. 4

7. Connect OEM Harness to Adaptor Module

8. Connect Speed Sensor/Motor Temperature Wire Harness to Controller (Fig. 5)

9. Install On-The-Fly Programmer (optional)

- Install OTF (optional) (see install description in RXV INSTALL instructions, p12)
- Connect OTF to Navitas Controller
- Zip Tie loose cables

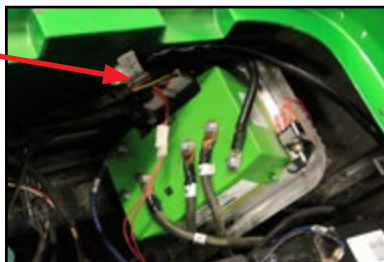


Fig. 5

10. Test Installation

- Lift rear wheels
- Reconnect battery pack
- Put in "RUN" mode
- Turn key on
- Put in "F" for Forward
- Press on throttle to activate wheels



Fig. 6

INSTALLATION INSTRUCTIONS

E-Z-GO DC to AC Conversion cont'd

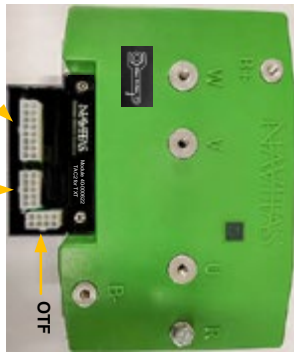
Pinout for Controller

To OTF Programmer
PN: 10-000586

- 6-POS Molex
- 39-28-1083
- P1: +12V PE
- P2: OTF Regen
- P3: OTF speed
- P4: OTF acceleration
- P5: +5V PE
- P6: OTF Lock
- P7: OTF LED
- P8: Analog GND

Navitas TAC2 AC Motor Controller
for EZ-GO TXT DC-AC Conversion
Product Model 10-000888-03 (440A)
10-000880-03 (600A)

Issue Date: 20181219



To OEM vehicle harness
(Curtis 1206HB)

- 16-POS Molex
- 39-28-1083
- P1: TTS Throttle Negative
- P2: TTS Throttle Positive
- P3: Fused GND
- P4: NA
- P5: Charger Interlock Input
- P6: Foot Switch In
- P7: Reverse Buzzer
- P8: Forward In
- P9: Logic Power In
- P10: Key In
- P11: NA
- P12: NA
- P13: NA
- P14: NA
- P15: NA
- P16: Reverse In

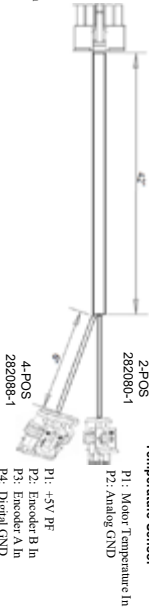
To Navitas AC Motor Adapter
PN: 40-000580

- 10-POS Molex
- 39-28-1103
- P1: +5V PE
- P2: Encoder A In
- P3: Encoder B In
- P4: Digital GND
- P5: NA
- P6: Motor Temperature In
- P7: Analog GND
- P8: NA
- P9: Key In
- P10: Motor Brake Solenoid Release

Vehicle Harness
AC Motor Adapter

- 10-POS Molex
- 39-01-2100
- P1: +5V PE
- P2: Encoder A In
- P3: Encoder B In
- P4: Digital GND
- P5: NA
- P6: Motor Temperature In
- P7: Analog GND
- P8: NA
- P9: NA
- P10: NA

Navitas AC Motor Adapter
40-000580



RES Post may not be installed in conversion model!

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

INSTALLATION INSTRUCTIONS

Club Car IQ (Precedent) DC to AC Conversion



CAUTION

Disconnect all batteries before beginning installation. If the car has a run/tow switch, you must place the switch in the TOW position first!

PARTS

- AC 4 kW motor
- AC Navitas controller
- Mounting plate w/ hardware
- Motor phase cable (4AWG)
- Speed sensor/motor temperature harness
- B+ cable for replacement from controller to solenoid
- On-The-Fly programmer (Optional)



1. Power down

- Turn off key, disconnect battery
- Put car on a stand and block wheels
- Use insulated tools
- Never use battery as workbench



To view our Installation video for Golf Cars, visit: NavitasVS.com/support

2. Remove OEM Protective Cover

- Remove cables from controller
- Unclip OEM wire harness

3. DC Motor and Controller Removal

- Raise car safely with jack/hoist and place on stands to be able to work safely from underneath car **or** pull batteries and work from top of battery box
- Remove (A1, A2, F1, F2 cables from DC Motor) dispose of F1, F2 cables and keep A1,A2 cables
- Cut off the short B+ cable from DC controller to solenoid. Continue to use the A2 Cable for new controller connection
- Remove cables from DC controller
- Remove OEM Controller (Fig. 3)



Fig. 3

INSTALLATION INSTRUCTIONS

Club Car IQ (Precedent) DC to AC Conversion cont'd

4. Install Navitas TAC 2 Controller

- Install NEW Club Car Precedent mounting plate using supplied hardware
- Connect motor phase cables A1=U A2 =V and NEW Motor Cable (in Kit) =W to the controller
- Connect NEW B+ cable from solenoid to controller and existing B- cable from battery pack to controller
- Install OTF (Optional). See OTF installation instructions in RXV install description p12
- Connect OEM harness to adaptor module
- Connect OTF to adaptor module (optional)
- Connect NEW speed sensor/motor temperature harness to controller
- Connect OEM wiring harness to controller (may need to chase back harness to free up sufficient slack)



Fig. 2

5. Install AC Motor

- Re-connect A1=U, A2=V and NEW motor cable=W from controller to the AC motor (examine to make sure the cables align from controller to motor exactly....U-U, V-V and W-W)
- Connect new speed sensor/motor temperature harness from controller to AC motor

6. TESTING INSTALLATION

- Make sure drive wheels are in the air
- Reconnect battery pack
- Put in RUN mode
- Turn key On
- Put in "F" for Forward
- Press on throttle to activate wheels

INSTALLATION INSTRUCTIONS

Club Car IQ (Precedent) DC to AC Conversion cont'd

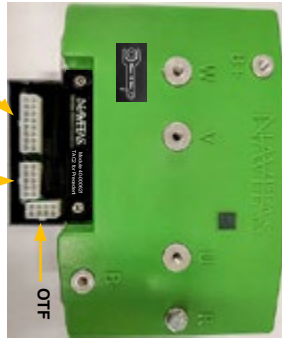
Pinout for Controller

Navitas TAC2 AC Motor Controller for Club Car Precedent DC-AC Conversion Product Model 10-000888-02 (440A) 10-000890-02 (600A)

Issue Date: 20181219

To OTF Programmer PN: 10-000686

- 8-POS Molex
39-28-1083
- P1: -12V PF
- P2: OTF Regen
- P3: OTF speed
- P4: OTF acceleration
- P5: -5V PF
- P6: OTF Lock
- P7: OTF LED
- P8: Analog GND



To OEM vehicle harness

- 16-POS Molex
39-28-1183
- P1: -5V PF
- P2: Throttle In
- P3: Neutral GND
- P4: NA
- P5: Clutch Interlock Input
- P6: Foot Switch In
- P7: Reverse buzzer
- P8: Forward In
- P9: Logic Power In
- P10: Key In
- P11: NA
- P12: Main Solenoid Out
- P13: NA
- P14: NA
- P15: NA
- P16: Reverse In

To Navitas AC Motor Adapter PN: 40-000580

- 10-POS Molex
39-28-1103
- P1: -5V PF
- P2: Encoder A In
- P3: Encoder B In
- P4: Neutral GND
- P5: NA
- P6: Motor Temperature In
- P7: Analog GND
- P8: NA
- P9: Key In
- P10: Motor Brake Solenoid Release

Vehicle Harness AC Motor Adapter

10-POS Molex 39-01-2100

- P1: -5V PF
- P2: Encoder A In
- P3: Encoder B In
- P4: Digital GND
- P5: NA
- P6: Motor Temperature In
- P7: Analog GND
- P8: NA
- P9: NA
- P10: NA

Navitas AC Motor Adapter 40-000580



To AC Motor Speed Sensor Temperature Sensor

- P1: Motor Temperature In
- P2: Analog GND
- P3: Encoder B In
- P4: Digital GND
- P5: Encoder A In
- P6: Digital GND

RES Post may not be installed in conversion model!

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

INSTALLATION INSTRUCTIONS

YAMAHA YDRE 2 (NEOS) Installation



CAUTION

Disconnect all batteries before beginning installation. If the car has a run/tow switch, you must place the switch in the TOW position first!

PARTS

- AC Controller
- Mounting plate with hardware
- Motor phase cable (4AWG)
- On-The-Fly programmer (Optional)



To view our Installation video for Golf Cars, visit: NavitasVS.com/support

1. Power down

- Turn off key, disconnect battery
- Put car on a stand and block wheels
- Use insulated tools
- Never use battery as workbench

2. Remove cables from OEM controller

- Unclip OEM Wire Harness

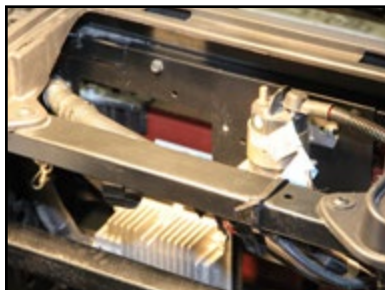


Fig. 1

3. Remove OEM Controller

4. Install YDRE Mounting Plate

- Align plate with existing holes (where OEM controller was fastened) and fasten with screws. (Fig. 2)
- To make it easier to install bolts on the left side of the controller, loosen and slide assembly to a central, more accessible position. (Fig. 2, 3, 4)

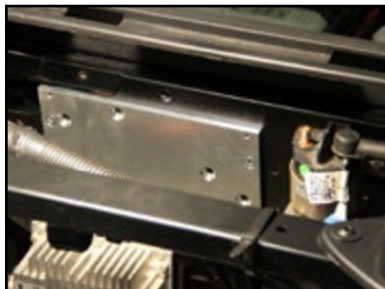


Fig. 2

INSTALLATION INSTRUCTIONS

YAMAHA YDRE2 (NEOS) Installation Cont'd

5. Mount Controller

- Install Navitas AC controller (*Fig. 3*)
- Connect B- from battery, B+ from solenoid using supplied battery cable, and motor phase cables to the controller:
 - Black - U
 - Red - V
 - White - W



Fig. 3

6. Connect OEM Harness to Adaptor Module

7. Install On-The-Fly Programmer (optional)

- Install OTF (optional) (see install description in RXV INSTALL instructions, p12)
- Connect OTF to Navitas Controller
- Zip Tie loose cables



Fig. 4

8. Test Installation

- Lift rear wheels
- Reconnect battery pack
- Put in "RUN" mode
- Turn key on
- Put in "F" for Forward
- Press on throttle to activate wheels



Fig. 5



Fig. 6

INSTALLATION INSTRUCTIONS

YAMAHA YDRE2 (TOYOTA) Installation Cont'd

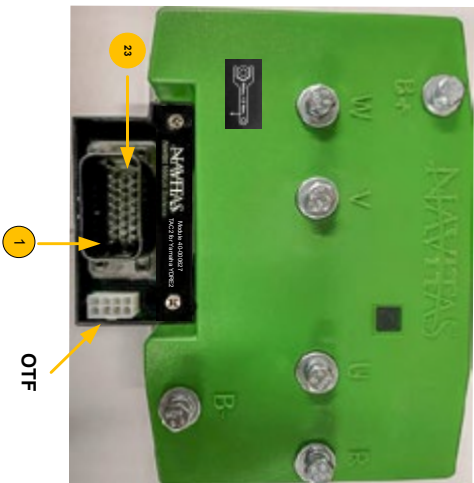
Pinout for Controller

To OTF Programmer PN: 10-000686

- 8-POS Molex
39-28-1083
- P1: +12V PF
- P2: OTF Regen
- P3: OTF speed
- P4: OTF acceleration
- P5: +5V PF
- P6: OTF Lock
- P7: OTF LED
- P8: Analog GND

**Navitas TAC2 AC Motor Controller
for YAMAHA YDRE2
Product Model 10-000888-01 (440A)
10-000890-01 (600A)**

Issue Date: 20181219



RES Post may not be installed in conversion model!

To OEM vehicle harness

23-POS Ampseal
776228-1

- P1: Logic Power
- P2: NA
- P3: NA
- P4: Throttle In
- P5: Logic Power
- P6: Main Solenoid
- P7: Rev Butzzer
- P8: Logic Power
- P9: +12V PF
- P10: SPD B In
- P11: SPD A In
- P12: Key In
- P13: Foot Switch In
- P14: Analog GND
- P15: Motor Temperature In
- P16: Battery Negative
- P17: Reverse In
- P18: Forward In
- P19: NA
- P20: +5V PF
- P21: NA
- P22: CAH Positive
- P23: CAN Negative

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

INSTALLATION INSTRUCTIONS

YAMAHA G29 DC to AC Conversion



CAUTION

Disconnect all batteries before beginning installation. If the car has a run/tow switch, you must place the switch in the TOW position first!

PARTS INCLUDED

- AC Controller
- AC 4 kW motor
- OTF programmer (optional)
- Mounting plate and hardware
- Run/Tow switch mount
- Motor phase cable
- Speed sensor/motor temperature harness
- Ring Terminal



1. Power down

- Turn off key, disconnect battery
- Put car on a stand and block wheels
- Use insulated tools
- Never use battery as workbench



To view our Installation video for Golf Cars, visit: NavitasVS.com/support

2. Remove OEM Controller

- Remove protective cover
- Remove cables from controller
- Unclip OEM Wire Harness

3. Prepare Cables

- Locate the 'Y' cable on the vehicle harness (*Fig. 1*). This cable consists of 2 cables crimped together into a single ring terminal. One side comes from the Battery Negative. The other wire is connected to the A2 on the motor. Use side cutters to cut the A2 wire at the ring terminal (*Fig. 2*). Then crimp the supplied ring terminal to the A2 wire (*Fig. 3*).

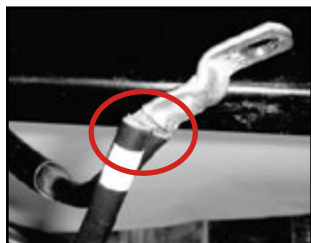


Fig. 1



Fig. 2

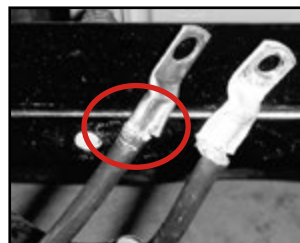


Fig. 3

INSTALLATION INSTRUCTIONS

YAMAHA G29 DC to AC Conversion cont'd

4. Install G29 Mounting Plate

- Align plate with existing holes (where OEM controller was fastened) and fasten with screws (Fig. 4)



Fig. 4

5. Mount Controller

- Install Navitas AC controller
- Attach Run/Tow switch mount and fasten Run/Tow switch to mount (Fig. 5).
- Connect B- from battery, B+ from solenoid and motor phase cables to U, V, W (use new cable provided as 'W' and re-use the 2 existing motor phase cables from A1=U, A2=V) to the controller (Fig. 6)



Fig. 5

6. Motor Conversion

- Remove motor phase cables A1, A2 from motor
- Remove and DISCARD field cables (F1, F2)
- Remove DC motor
- Install Navitas AC motor
- Connect new speed sensor/motor temp harness to motor
- Connect motor phase wires from controller (A1 =U, A2 = V and new cable = W)
- Check cabling to make sure U, V, and W match exactly from motor to controller

7. Connect OEM Harness to Adaptor Module

8. Install On-The-Fly Programmer (optional)

- Install OTF (optional) (see install description in RXV INSTALL instructions, p12)
- Connect OTF to the adapter module
- Zip Tie loose cables



Fig. 6

9. Test Installation

- Lift rear wheels
- Reconnect battery pack
- Put in "RUN" mode
- Turn key on
- Put in "F" for Forward
- Press on throttle to activate wheels

INSTALLATION INSTRUCTIONS

YAMAHA G29 DC to AC Conversion cont'd

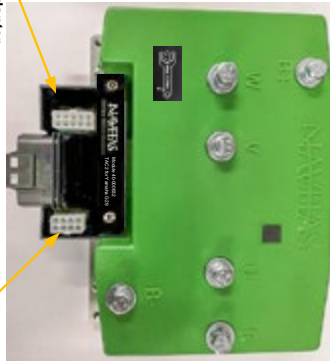
Pinout for Controller

Navitas TAC2 AC Motor Controller for YAMAHA G29 DC-AC Conversion Product Model 10-000888-09 (440A)

Issue date: 2019.12.19

To OTF Programmer
PN: 10-0006886

- P1: +12V PF
- P2: OTF Regen
- P3: OTF Speed
- P4: OTF acceleration
- P5: OTF PF
- P6: OTF Park
- P7: OTF LED
- P8: Analog GND



AC Motor Adapter

OTF

To OEM vehicle harness

- 26 POS Motor
- M2X2625NF1
- P1: NA
- P2: Charger Interlock In
- P3: Main Solenoid Out
- P4: Reverse Buzzer Out
- P5: +5V PF
- P6: GND Poly
- P7: Throttle In
- P8: Rev In
- P9: Key In
- P10: Forward In
- P11: Foot Switch In
- P12: Logic Power In
- P13: Logic Power In
- P14: NA
- P16: +5V PF
- P17: GND Poly
- P18: NA
- P19: NA
- P20: NA
- P21: NA
- P22: NA
- P23: NA
- P24: GND Poly
- P25: +5V PF
- P26: NA

To Navitas AC Motor Adapter
PN: 40-000580

- 10-POS Motor
- 39-28-1103
- P1: +5V PF
- P2: Encoder A In
- P3: Encoder B In
- P4: Digital GND
- P5: NA
- P6: Motor Temperature In
- P7: Analog GND
- P8: NA
- P9: Rev In
- P10: Motor Brake Solenoid Release

Navitas AC Motor Adapter
40-000580

- 10-POS Motor
- 39-01-2100
- P1: +5V PF
- P2: Encoder A In
- P3: Encoder B In
- P4: Digital GND
- P5: NA
- P6: Motor Temperature In
- P7: Analog GND
- P8: NA



To AC Motor
Speed Sensor
Temperature Sensor

- P1: Motor Temperature In
- P2: Analog GND
- P1: +5V PF
- P2: Encoder B In
- P3: Encoder A In

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

TROUBLESHOOTING

* Check the 'Caution' icon on app first for fault descriptions or refer to the chart below

FLASH CODES	FLASH CODE MESSAGE	DESCRIPTION	SOLUTION	HOW TO CHECK
1-1	Throttle Fault	<p>The foot switch is not engaged and the throttle signal voltage is above minimum throttle parameter.</p> <p>This indicates the foot switch is not coming on or the throttle has broken where its off voltage is to high</p>	<ul style="list-style-type: none"> • Check wiring • Replace throttle 	<ul style="list-style-type: none"> • The diagnostic page of the App will give you readings for the throttle voltage and foot switch. • Put the vehicle in neutral and slowly depress the throttle. • The foot switch should change from Off to On before the throttle voltage reaches around 1V. • Standard throttles usually read 0.5V when off. The minimum voltage to start the vehicle is usually 1V. The maximum when depressed should read around 4V.
1-2	Brake Fault	<p>The analog brake signal is higher than the high voltage threshold which is 4.64V.</p> <p>These types of brake pedals are only installed on certain types of vehicles such as RXV's.</p>	<ul style="list-style-type: none"> • Check wiring • Replace brake switch 	<ul style="list-style-type: none"> • The diagnostic page of the App will give you readings for the brake voltage • Put the vehicle in neutral and slowly depress the brake. • Standard analog brakes usually read 0.5V when off. The minimum voltage to stop the vehicle is usually 1V. The maximum when depressed should read around 3V to 4V
1-3	Charger Interlock	<p>Charger is connected and the vehicle is not in neutral.</p> <p>Vehicle charging port may be wet Club Car On Board Computer (OBC) is in sleep mode.</p>	<ul style="list-style-type: none"> • Disconnect the Charger before trying to move. • Dry and clean the charger port • Depress the throttle twice to wake up OBC. • Replace charger port on vehicle 	<ul style="list-style-type: none"> • The diagnostic page of the App will give you readings for the charger input connected signal. • The charger input will read off when there is no charger connected.
1-4	Temperature (Controller)	<p>Performance is limited because the controller is hot.</p>	<ul style="list-style-type: none"> • Let vehicle cool off, system is over worked. 	<p>Check the temperature of the controller with a non-contact temperature sensor</p>
1 - 5	Temperature (Motor)	<p>Performance is limited because the motor is hot.</p>	<ul style="list-style-type: none"> • Let vehicle cool off, system is over worked. 	<ul style="list-style-type: none"> • Check the temperature of the motor with a non-contact temperature sensor.

TROUBLESHOOTING cont'd

FLASH CODES	FLASH CODE MESSAGE	DESCRIPTION	SOLUTION	HOW TO CHECK
1 - 6	Solenoid High Resistance	Voltage across solenoid (battery side (logic power) to controller side measured (B+ terminal)) is greater than the hard coded 5V.	<ul style="list-style-type: none"> • Replace solenoid 	<ul style="list-style-type: none"> • Test the solenoid by measuring ohms across the large terminals. • The error usually only occurs when drawing large currents (200A) through the solenoid. The solenoid may be under rated or oxidizing with ag
1 - 7	Flash Memory Error	Code updates from the App may force this error so cause the user to press the Initialize button and Save button.	<ul style="list-style-type: none"> • Press the Initialize button and Save button in the App. 	<ul style="list-style-type: none"> • Contact dealer as they have a "Dealer/Technician" version of the App.
2 - 1	Direction Switch Fault	Both FWD & REV signal came on at the same time.	<ul style="list-style-type: none"> • Check and replace FWD & REV switch 	<ul style="list-style-type: none"> • The diagnostic page of the App will give you readings for the Forward switch and Reverse switch • Check the Switch. Does the Switch feel the same when toggled from FWD to Neutral to REV? If so check continuity of the switch.
2 - 2	Main Solenoid	Voltage across solenoid (battery side to controller side measured B+ terminal) is greater than the hard coded 1V after solenoid has closed	<ul style="list-style-type: none"> • Confirm the solenoid is working properly. Change solenoid if required. 	<ul style="list-style-type: none"> • Put vehicle in Neutral. Measure voltage on main terminals (high current connections) of the solenoid. Depress throttle and listen for solenoid to click. If solenoid clicks and the voltage does not drop to zero between the main terminals. Replace solenoid. • If solenoid does NOT click measure the voltage across the small terminals of the solenoid when the throttle is depressed. It should read the battery voltage. If it reads the battery voltage the solenoid is bad. If it does not read the battery voltage check vehicle wiring

TROUBLESHOOTNG cont'd

FLASH CODES	FLASH CODE MESSAGE	DESCRIPTION	SOLUTION	HOW TO CHECK
2 - 3	Controller not pre-charging	Abnormally low voltage on the controller between B+ and B-.	<ul style="list-style-type: none"> • Clean and dry off the controller • Check voltage • Check all wires are connected to controller • DO NOT 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! 	<ul style="list-style-type: none"> • The dashboard page of the App will give you readings for the battery voltage. • Visually check for debris or moisture on controller terminals and wires (There may be a short across the B+ and B-terminals). • Check the voltage between B+ and B- on the controller. It should equal the battery pack voltage. • Check that the wires are not damaged. • Check that no accessories (light kits, stereos, etc.) are using the frame as a 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 key switch, depress the throttle. If Flash Code 2-4 returns replace the controller. • Otherwise there is a wiring problem. Reconnect wires one at a time (turn off RUN/TOW switch each time) until Flash Code 2-4 returns. This will indicate where the wiring issue is located.
2 - 4	Main Solenoid Current Fault	Solenoid coil takes too much current.	<ul style="list-style-type: none"> • Check for loose wires or a short across small terminals on the solenoid. • Replace main solenoid. 	<ul style="list-style-type: none"> • Check for loose wires. If there is a diode across the solenoid check that it is not shorted. • Test solenoid by measuring resistance across the small terminals of the solenoid. The resistance should be greater than 48 OHMS if it is a single coil solenoid and greater than 20 OHMS if it is a double coil solenoid.
2 - 5	Parking Brake Solenoid (Connected to motor) Current Fault	Solenoid coil takes too much current.	<ul style="list-style-type: none"> • Check for loose wires or a short across small terminals on the solenoid. • Replace main solenoid. 	<ul style="list-style-type: none"> • Check for loose wires. If there is a diode across the solenoid check that it is not shorted. • Test solenoid by measuring resistance across the small terminals of the solenoid. The resistance should be greater than 48 OHMS if it is a single coil solenoid and greater than 20 OHMS if it is a double coil solenoid.

TROUBLESHOOTING cont'd

FLASH CODES	FLASH CODE MESSAGE	DESCRIPTION	SOLUTION	HOW TO CHECK
3 - 1	Battery Under Voltage	Batteries are empty or too low.	<ul style="list-style-type: none"> • Recharge batteries • Check for bad or damaged batteries. • Check battery cables are not loose or damaged. • Check solenoid 	<ul style="list-style-type: none"> • Use a battery load tester to verify battery condition after charging. • Connect volt meter batteries. (Use alligator clips). Measure the voltage while driving to see if the voltage drops. • Connect Volt meter to the controller if the voltage drops at the controller and not at the battery then the solenoid may be bad.
3 - 2	Battery Over Voltage	Batteries are over charged or not excepting any more regenerative currents	<ul style="list-style-type: none"> • Check for bad or damaged Batteries. • Check Battery Cables are not loose or damaged. • Check Solenoid 	<ul style="list-style-type: none"> • Use a battery load tester to verify battery condition after charging. • Connect volt meter batteries. (Use alligator clips). Measure the voltage while driving to see if the voltage rises. • Connect volt meter to the controller if the voltage rises at the controller and not at the battery then the solenoid may be bad.
3 - 3	Motor Over Current	Motor current has risen above the maximum motor current parameter.	<ul style="list-style-type: none"> • Check Motor U,V,W cables are not shorted to ground <p>See diode chart below</p>	<ul style="list-style-type: none"> • The diagnostics page of the App will give you readings for the U phase voltage, V phase voltage, W phase voltage • The phases should read around half the battery voltage. • Disconnect phases at controller and check readings again

TROUBLESHOOTING cont'd

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.	<ul style="list-style-type: none"> • Batteries are discharged • Bad or damaged motor • Faulty speed sensor • Faulty throttle • OTF programmer is locked at low speed 	<ul style="list-style-type: none"> • Re-charge the batteries • Check brakes are releasing properly and vehicle is easy to push • Check motor • With the App verify throttle reaches maximum value • 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	<ul style="list-style-type: none"> • Check vehicle wiring for loose connections • Check the OBC (On Board Computer) 	<ul style="list-style-type: none"> • Check the OBC by referring to the "OBC section" in the manufacturer's service manual.
Vehicle feels sluggish after driving for a while.	<ul style="list-style-type: none"> • Battery cables are undersized 	<ul style="list-style-type: none"> • Upgrade the power cables to recommended 4AWG
Faulty Controller	<ul style="list-style-type: none"> • Controller malfunction 	<ul style="list-style-type: none"> • Use a digital multi-meter set to diode mode  • Remove all wires and cables on controller • Use "Controller Diode Test" chart below to test the controller
Car Stutters	<ul style="list-style-type: none"> • Motor cables are not connected properly 	<ul style="list-style-type: none"> • Check motor cables properly connected U-U< V-V, W-W • Check speed sensor wires not crossed.

Table 1 **Controller Test Diode Chart**

BLACK LEAD 	RED LEAD 	VOLTAGE 
B+	U	0.42 V approx.
U	B-	0.42V approx.
B+	V	0.48V approx.
V	B-	0.48V approx.
B+	W	0.48V approx.
W	B-	0.48V approx.

ACCESSORIES

Bluetooth® Apps for TAC 2.0

Customer and Dealer App available for Android and Apple IOS:



IOS: <https://itunes.apple.com/us/app/dashboard-navitas/>



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
- 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 email directly to your service technician/dealer for quick REMOTE diagnosis



Free Bluetooth Dealer App*

Download available upon registration with Navitas
Call Toll-Free: 1-844-576-2499

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 email
- Emails can also be forwarded to NAVITAS engineering department for additional support
- Upgrade Firmware with ease.

*Actual screen format and features may vary.

Visit NavitasVS.com/support for more App support documentation.

APPENDIX A

MAC Performance Motor 10-000815 for CLUB CAR PRECEDENT



MAC-A

High Performance AC Golf Car Motor (10-000815)

MOTOR FEATURES

- ✓ Hi Quality AC Induction motor
- ✓ External Speed Sensor
- ✓ Internal temperature sensor
- ✓ Steel and Aluminum construction
- ✓ High torque with High speed



MOTOR DATA

Type of Motor	AC Induction
Rated power	4 KW
Rated Voltage	34 V (AC)
Rated Current	91 A
Rated Speed	3600 r/min
Rated Frequency	123 Hz
RPM	0-6800 r/min
Splines	10
Insulation class	H
Protection mode	IP44

Applications

- ✓ Golf Car
- ✓ Utility Vehicle
- ✓ Motorcycle
- ✓ Personnel Carriers

APPENDIX A

MAC Performance Motor 10-000816 For EZ-GO, YAMAHA, STAR EV,
and COLUMBIA CAR PAR



MAC-A

High Performance AC Golf Car Motor (10-000816)

MOTOR FEATURES

- ✓ Hi Quality AC Induction motor
- ✓ External Speed Sensor
- ✓ Internal temperature sensor
- ✓ Steel and Aluminum construction
- ✓ High torque with High speed



MOTOR DATA

Type of Motor	AC Induction
Rated power	4 KW
Rated Voltage	34 V (AC)
Rated Current	91 A
Rated Speed	3600 r/min
Rated Frequency	123 Hz
RPM	0-6800 r/min
Splines	19
Insulation class	H
Protection mode	IP44

Applications

- ✓ Golf Car
- ✓ Utility Vehicle
- ✓ Motorcycle
- ✓ Personnel Carriers

APPENDIX A

MAC Performance Motor 10-000822 for CLUB CAR PRECEDENT



MAC822

High Performance AC Golf Car Motor (10-000822)

MOTOR FEATURES

- ✓ Hi Quality AC Induction motor
- ✓ External Speed Sensor
- ✓ Internal temperature sensor
- ✓ Steel and Aluminum construction
- ✓ High torque with High speed

MOTOR DATA

Type of Motor	AC Induction
Rated power	5 KW
Rated Voltage	34 V (AC)
Rated Current	113 A
Rated Speed	2785 r/min
Frequency	0~200 Hz
RPM	0~5785 r/min
Splines	19
Insulation class	H
Protection mode	IP44



Applications

- ✓ Golf Car
- ✓ Utility Vehicle
- ✓ Personnel Carriers

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APPENDIX A

MAC Performance Motor 10-000823 For EZ-GO, YAMAHA, STAR EV,
and COLUMBIA CAR PAR



MAC823

High Performance AC Golf Car Motor (10-000823)

MOTOR *FEATURES*

- ✓ Hi Quality AC Induction motor
- ✓ External Speed Sensor
- ✓ Internal temperature sensor
- ✓ Steel and Aluminum construction
- ✓ High torque with High speed

MOTOR *DATA*

Type of Motor	AC Induction
Rated power	5 KW
Rated Voltage	34 V (AC)
Rated Current	113 A
Rated Speed	2785 r/min
Frequency	0~200 Hz
RPM	0~5785 r/min
Splines	10
Insulation class	H
Protection mode	IP44

Applications

- ✓ Golf Car
- ✓ Utility Vehicle
- ✓ Personnel Carriers



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WARRANTY

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.

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