Navitas Vehicle Systems Ltd.

NAVITAS TAC 2

440A and 600A 48V-72V CONTROLLERS

Error Code and Troubleshooting Guide

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® YDRE2® TOYOTA® (NEOS®)
YAMAHA® G29® Conversion (MORIC®)

NAVITAS

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**	The foot switch is not engaged and the throttle signal voltage is above minimum throttle parameter. This indicates the foot switch is not coming on or the throttle has broken where its off voltage is too high	• Check wiring • Verfiy throttle operation • Calibrate Throttle • Replace throttle	• 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 throttle min setting on the settings page of the app. • Standard throttles usually read 0.5V in the app when off. The minimum voltage to start the vehicle is usually 1V. The maximum when depressed should read around 4V.
1-2	**Brake Fault** (RXV Only)	The analog brake signal is higher than the high voltage threshold which is 4.64V.	• Check wiring • Replace brake Sensor	• The diagnostic page of the App will give you readings for the brake voltage • Put the vehicle in neutral and slowly depress the brake. Ensure voltage reads between ~0.5v to ~4v
1-3	**Charger Interlock**	Charger is connected and the vehicle is not in neutral. If just installed Lithium battery	• Disconnect the Charger before trying to move. • Charger Interlock not wired in cart	• 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. • Toggle Invert Charger Input on Settings page of app
1-4	**Temperature (Controller)**	Performance is limited because the controller is hot.	• Let vehicle cool off, system is over worked.	Check the temperature of the controller with a non-contact temperature sensor
1 - 5	**Temperature (Motor)**	Performance is limited because the motor is hot.	• Let vehicle cool off, system is over worked • Temp Sensor connector is loose • Check temperature sensor in app is set for the correct one for that cart	• Check the temperature of the motor with a non-contact temperature sensor. • Check motor temperature sensor wires are making connected. Re-seat connector. • Turn cart OFF, unplug temp sesnor from harness. Measure motor side connector for resistance. ~600Ω is the KTY84 ~1000Ω is the PT1000 • Set the correct thermistor in the settings page of the app.

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.	• Replace solenoid	• 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 age
1 - 7	**Parameter Table not intialized**	Code updates from the App may force this error so cause the user to press the Initialize button and Save button.	• Press the Initialize button and Save button in the App.	• Go to the settings page, press the Initialize button and Save button in the App.
1 - 8	**Brake Check Fault**	Brake failed to hold vehicle still during start up tests. Vehicle should not move during brake check.	• Check motor brake	• Turn key off and disconnect brake harness from motor brake. Try pushing vehicle, you should not be able to push vehicle. • If new brake has been installed, check installation, over/under torquing brake can cause issues
1- 9	**Brake Hold Fault**	Brake failed to hold vehicle still when stopped. Wheels are still turning with Parking Brake set.	• Check motor brake	• Turn key off and disconnect brake harness from motor brake. Try pushing vehicle, you should not be able to push vehicle. • If new brake has been installed, check installation, over/under torquing brake can cause issues
1- 10	**Resistor Check Fault**	The large external power resistor was not detected during start up tests.	• Check resistor wiring	• Resistor wires should go to controller B+ side of the solenoid and to the 'R' terminal on the controller. DO NOT TO CONNECT TO BATTERY SIDE OF SOLENOID
2 - 1	**Direction Switch Fault**	Both FWD & REV signal came on at the same time.	• Check and replace FWD & REV switch • Dry out F/R switch if it got wet	• 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.

TROUBLESHOOTNG cont'd

FLASH CODES	FLASH CODE MESSAGE	DESCRIPTION	SOLUTION	HOW TO CHECK
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	• Confirm the solenoid is working properly. Change solenoid if required.	• 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
2 - 3	**Controller not pre-charging**	Abnormally low voltage on the controller between B+ and B-.	• 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 - 3 have been completed and the motor has been tested for short circuits!**	• 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 2-3 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 2-3 returns. This will indicate where the wiring issue is located.

TROUBLESHOOTING cont'd

FLASH CODES	FLASH CODE MESSAGE	DESCRIPTION	SOLUTION	HOW TO CHECK
2 - 4	**Main Solenoid Current Fault**	Solenoid coil takes too much current.	• Check for loose wires or a short across small terminals on the solenoid. • Replace main solenoid.	• 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	**Motor Brake Solenoid (Connected to motor) Current Fault** (RXV Only)	Motor Brake coil pulling too much current.	• Check for loose wires or a short across small terminals on the motor brake. • Replace motor brake	• Check for loose wires.
2-8	**Precharging Too fast**	1. Main solenoid may be welded. 2. (External Resistor Option Only) Regen resistor may be incorrectly connected to battery side of main solenoid.	• Check Main Solenoid • Check resistor wiring	• 1. Turn Key off and place in Tow. Measure voltage across large terminals of solenoid. If you measure anything but 0V, the solenoid is welded • 2a. Check Resistor wiring. Resistor wires should go to switched side of solenoid (controller side) and to the 'R' terminal on the controller. • 2b. Turn Key off and place in Tow. Disconnect controller 'B+' and 'R' cables. Make sure to isolate them with electrical tape. Place in Run and turn Key on check to see if error changes. If error changes, turn key off and place in Tow again. Then reconnect 'B+' cable and repeat. If error does not reappear, repeat process again and reconnect resistor to 'R' terminal. If the problem reappears, recheck the resistor wiring.
2-9	**Main Solenoid Open During Parking Brake Test**	Solenoid didn't close during the parking brake test	• Check Main Solenoid	• Upgrade Firmware to v8.0 or higher

FLASH CODES	FLASH CODE MESSAGE	DESCRIPTION	SOLUTION	HOW TO CHECK
3 - 1	**Battery Under Voltage**	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 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	• Check for bad or damaged Batteries. • Check Battery Cables are not loose or damaged. • Check Solenoid	• 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.	• Check Motor U,V,W cables are not shorted to ground **See diode chart below**	• 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
4-5	**Over Current Fault**	Motor current has exceeded controller current limit.	• Release throttle and reapply to drive	• Error code will clear when key is off and in Tow.

FLASH CODES	FLASH CODE MESSAGE	DESCRIPTION	SOLUTION	HOW TO CHECK
4-7	**Power Stage Fault**	Controller has failed power check on startup	• Check motor connections	• Turn Key off, place in Tow. • Disconnect U,V,W from controller. • Place in Run, turn on Key. • Check if error message now shows that motor is not connected. If error continues to show, contact Navitas Support. Please take screenshot of error message to provide to Navitas Support
4-8	**Encoder A input Fault**	Speed input A is not changing when Motor Current is Applied	• Check speed sensor	• With Key off and vehicle in Tow, disconnect speed encoder harness from motor. (4 pin connector at motor) • Place vehicle in Run and turn Key on. • Using a volt meter, measure the voltage at each of the pins. You should read 5V, 3V, 3V, 0V on the wires. • Reconnect to controller with app. Go to Diagnostics page and look for Encoder A & B inputs. • With a piece of wire or a paperclip, short the 3V wires to the 0V wire and check on the app if the input has gone from high to low. If it has, the inputs at the controller are working and the sensor may be at fault.
4-9	**Encoder B input Fault**	Speed input A is not changing when Motor Current is Applied	• Check speed sensor	
4-12	**Encoder Rate Limit Fault**	Speed input A is not changing when Motor Current is Applied	• Check speed sensor	• Check Encoder wires and connectors for damage. • Remove Encoder from motor, check for debris and reset Encoder. • Contact Technical Support for further testing.

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.	• Batteries are discharged • Bad or damaged motor • Faulty speed sensor • Faulty throttle • OTF programmer is locked at low speed	• 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	• Check vehicle wiring for loose connections • Check the OBC (On Board Computer)	• Check the OBC by referring to the "OBC section" in the manufacturer's service manual.
Vehicle feels sluggish after driving for a while.	• Battery cables are undersized	• Upgrade the power cables to recommended 4AWG
Faulty Controller	• Controller malfunction	• 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
Vehicle Stutters	• Motor cables are not connected properly • Motor cables are not connected properly	• Check motor cables properly connected U-U< V-V, W-W • Check speed sensor wires not crossed. • Check speed sensor works

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.

BLACK LEAD ⊖	RED LEAD ⊕	VOLTAGE →|
W	B-	0.48 V approx.
B+	R	0.15V - 0.30V approx.
R	B-	0.48V approx.

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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