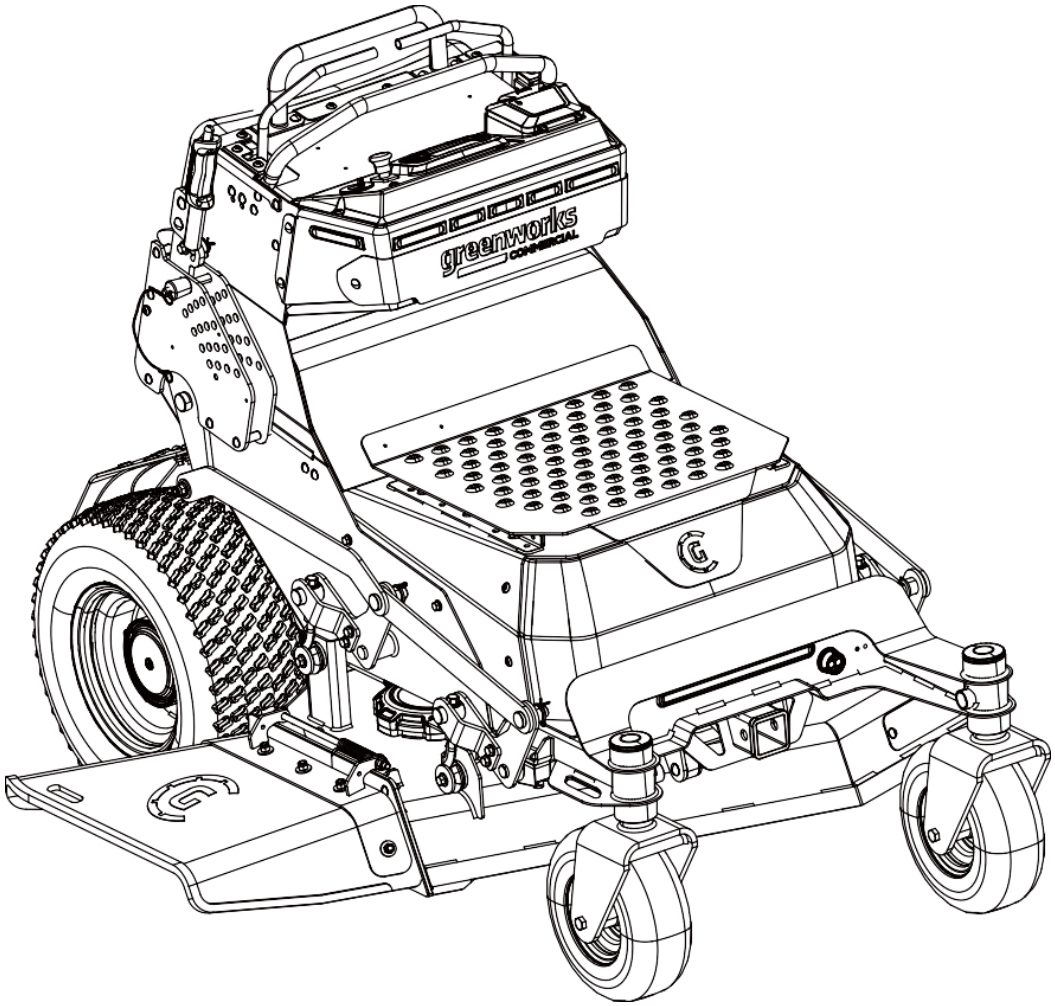
OS932 / OS936 / ZTCS92

Service Manual



WARNING:

Undertaking repairs to gardening tools can be hazardous. Use correct tools and safety devices noted in the manual and obey all the instructions. Do not proceed until you are confident that you understand all steps and is competent at the repair work. Some repairs must only be performed by a qualified technician.

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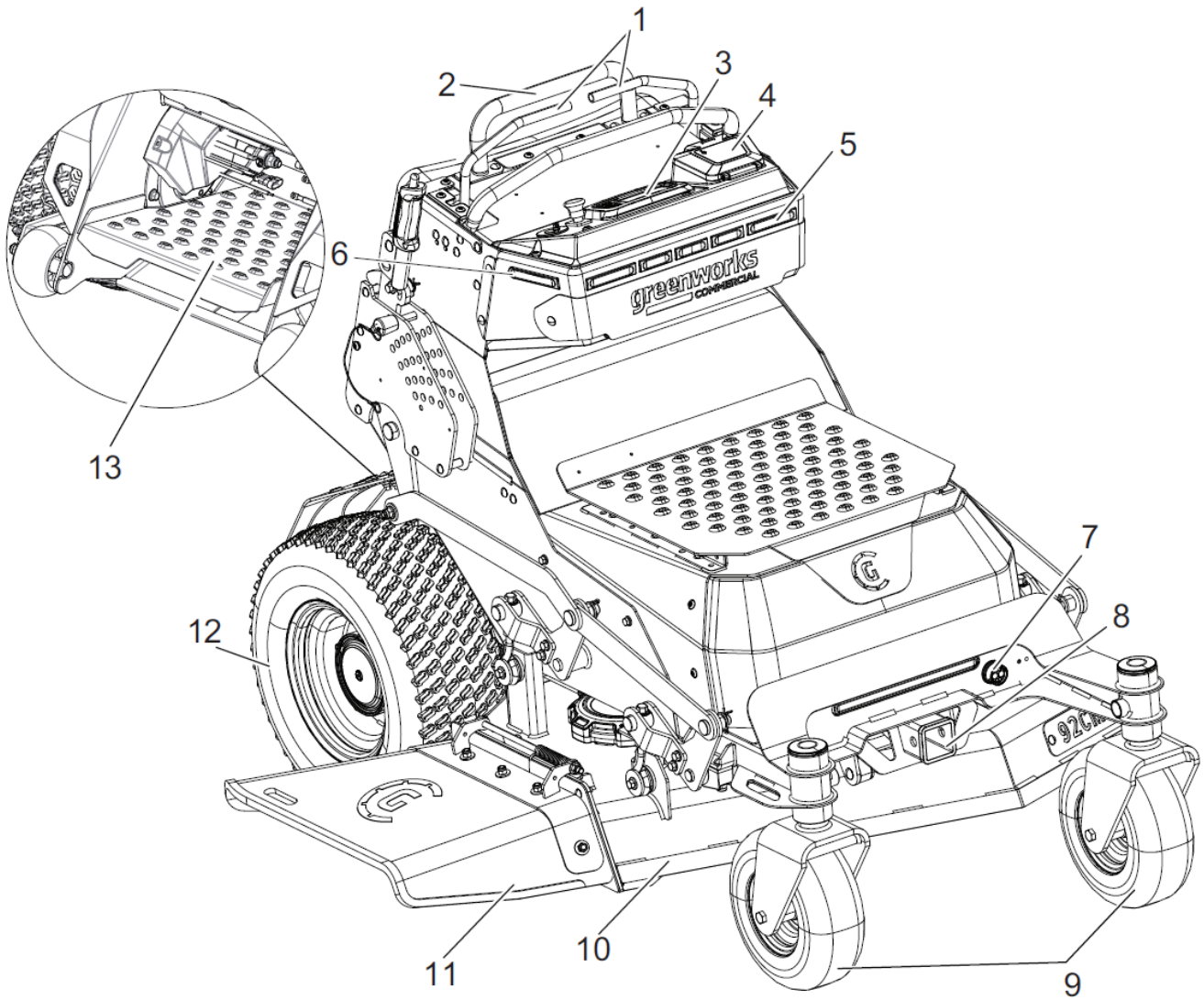
1 Component Location



1. Steering control levers
2. Hand stabilizer bars
3. Control panel
4. USB port
5. LED light, front
6. Warning light, side
7. ETO socket
8. Attachment port
9. Front wheels
10. Deck
11. Discharge chute
12. Drive wheels
13. Foot pedal

1.1 Terminology

Abbr.	Full term
BMS	Battery Management System
CAN	Controller Area Network
CRC	Cyclic Redundancy Check
EMR	Emergency Reverse
ETO	Electrical Take Off
HPD	High Pedal Disable
HW	Hardware
LOS	Limited Operating Strategy
NMT	Network Management Transmission
NV	Non-Volatile
OS	Operating System
PC	Personal Computer
PDO	Process Data Object
PTO	PTO Switch
SW	Software
VCL	Vehicle Control Language
KSI	Key Switch Ignition

2 Maintenance Safety

2.1 Before Maintenance and Repair

1. Switch the power button to OFF.
2. Remove the key and store it in a safe place.
3. Turn Service Switch to OFF position.
4. Lift the seat and remove the battery cables (P+P-C+C-) from the battery. (Allow 30 seconds for the system to be de-energized).

Note: It is recommended that you install a Lockout/Tagout device on the red cable (P+).

If performing maintenance on the 82V electrical system, confirm the system is de-energized by using a digital voltmeter reading DC (V) and placing the black test lead on the (B-) connection at the right wheel controller, and the red test lead on the (B+) connection at the main fuse to verify the absence of voltage.

Now that you have confirmed the system is de-energized, you can move forward with the maintenance and repair of the 82V electrical system.

2.2 Warnings

1. All disassembly, replacement, repair, and maintenance operations must be performed by professional technicians who have read this manual.
2. For the ease of quick disassembly and maintenance, you are advised to: before disassembly, put the machine in a suitable work area; prepare the necessary disassembly tools beforehand; remove the bolts in an appropriate order; put the disassembled parts in a clean work area.
3. In addition to obeying the conventional procedures for most repairing processes, there are some other special reminders:

- Before any maintenance work, turn the Contact Breaker Switch to the OFF (0) position, and if necessary, disconnect the main power supply of the mower.
- Do not put dangerous (flammable or explosive) items on the battery compartment.
- When replacing sharp and dangerous parts such as blades, protective gloves or other protective measures must be used.
- No operations shall be carried out before all the moving parts have come to a standstill.
- To avoid any personal injury or death, make sure that no one other than the maintenance technician is near the mower under repair or touches the mechanical parts by accident.

4. When replacing the left or right drive motor during the maintenance process, be sure to lift the rear wheels off the ground. Follow on motor self-learning guidelines defined in service manual and ensure that the self-learning process is successful.

   When replacing the left or right drive controller, you need to reflash these controllers' program first, then perform the drive motor self-learning process and ensure that the self-learning process is successful.

3 Winterize Maintenance

1. Pressure wash mower with caution.

Wear proper PPE (Personal Protective Equipment) before service, such as safety glasses and gloves. Unplug the power cord from the outlet before starting any maintenance or cleaning to reduce risk of electric shock. Turn off and remove key fob before servicing or cleaning. Unexpected operation of the mower may result in serious personal injury.

The best tool to clean battery/electrical compartment is vacuum cleaner. **DO NOT** spray battery/electronics compartment with water. Clean battery/electronics compartment with compressed air or blower if vacuum cleaner is not available. It is OK to pressure wash an electrical zero turn but requires caution:

- Avoid Electrical Components: Direct high-pressure water can damage electrical components, connectors, and wiring. Cover these parts or avoid spraying them directly.
- Use Low Pressure: If you need to clean the mower, use a low-pressure setting to reduce the risk of damage. It is safer to use a garden hose with a gentle spray and mild detergent for cleaning. Before cleaning the deck - raise the front of the machine and use jack stands to support the mower.
- Keep Distance: Maintain a safe distance between the pressure washer nozzle and the mower to prevent damage from the force of the water.
- Dry Thoroughly: Ensure the mower is thoroughly dried after washing to prevent any moisture-related issues with the electrical components.

2. Remove internal dirt and debris manually first and then by vacuum (blowing is not recommended).

3. Check for loose or damaged mechanical components, tighten or replace as needed. Especially bolts for blades and nuts for wheels. Follow torque guidelines defined in Service Manual.

4. Check and adjust tire pressure. Follow tire pressure guidelines defined in Operator Manual or Service Manual.

5. Check, clean and test brakes.

- Locate left and right electro-magnetic brakes on drivetrain. Check if there is any damage, loose, rust, dust, foreign material (for example rock get stuck in brake which may affect brake function). Remove foreign material and clean if necessary.
- Park the vehicle on flat ground, release both left and right brakes, push the vehicle to see whether it can be moved easily. The purpose of this test is to make sure vehicle can be moved in case of break down.
- Park the vehicle on 20^0 slope to see whether brake function is normal.
- Follow on electromagnetic brake release guidelines defined in Service Manual.

6. Lubricate all pivot points. Use light oil or spray lubricant to lubricate the deck-lift pivots, platform pivots of stand-on mowers etc.

7. Sharpen or replace mower blades.

8. Adjust deck levelling and cutting height. Follow deck height adjustment guidelines defined in Service Manual.

9. Touch up paint if needed.

10. Ensure all safety labels are in place, replace as needed. Check dealer portal to find service parts information.

4 Electrical System

4.1 Errors

4.1.1 Error list

The CANBUS system takes actions to protect the user and the machine when it detects an issue. When it acts to turn off the mower or a component, it indicates that an error occurs and error code is shown on the digital display. Each electrical error has a letter code followed by a number.

The first letter describes the system that caused the error:

Letter	Meaning
BMS	Battery Error Code
BC	Battery Charger Error Code
TR	Right Wheel Motor Controller Error Code
TL	Left Wheel Motor Controller Error Code
ML	Left Blade Motor Controller Error Code
MM	Middle Blade Motor Controller Error Code
MR	Right Blade Motor Controller Error Code
FA	Front Attachment Error code
DS	Display Screen Error Code

Most errors can be quickly corrected by noting what caused the issue, restarting the machine (cycle key switch / ignition [KSI]) and changing how the operator uses the machine.

Use the chart below to find the solution for an immediate fix during operation or more detailed solution if the problem persists to be completed by a trained professional.

4.1.2 Error Code

Table 1 display screen error code

Error codes	Error contents	Immediate fix solution during operation
DS 11	Display CAN Communication Abnormal	• Please check the maintenance switch is set to “I” / ON condition. • Please check if the CAN wire on the display or the right wheel motor controller is well connected. • Please restart the vehicle. • If error persists, please refer to troubleshooting section for error code DS 11. • If error persists after completing the above inspections, please contact dealer for after-sales service.
DS 12	Right Wheel Controller CAN Communication Abnormal	• Please check the maintenance switch is set to “I” / ON condition. • Please check if the CAN wire on the display or the right wheel motor controller is well connected. • Please restart the vehicle. • If error persists, please refer to troubleshooting section for error code DS 12. • If error persists after completing the above inspections, please contact dealer for after-sales service.
DS 13	BMS CAN Communication Abnormal	• Please check if the CAN wire on the Battery is well connected. • Please restart the vehicle. • If error persists, please refer to troubleshooting section for error code DS 13. • If error persists after completing the above inspections, please contact dealer for after-sales service.

Table 2 BMS error codes

Error codes	Error contents	Immediate fix solution during operation
BMS 11	Battery discharging slight overtemp	• Vehicle has been put into a state of reduced performance while cooling. Once temperature is back within standard range, the error will automatically clear and normal operation will resume. • If error persists, please refer to troubleshooting section for error code BMS 11.

Error codes	Error contents	Immediate fix solution during operation
		• If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 12	Battery discharging severe overtemp	• Vehicle has been disabled while cooling. Once temperature is back within standard range, the vehicle can be restarted to clear the error and resume operation. • If error persists, please refer to troubleshooting section for error code BMS 12. • If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 13	Battery discharging slight undertemp	• Vehicle has been put into a state of reduced performance while warming. Once temperature is back within standard range, error will automatically clear and normal operation will resume. • If error persists, please refer to troubleshooting section for error code BMS 13. • If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 14	Battery discharging severe undertemp	• Vehicle has been disabled while warming. Warming can take up to [Display Time] hours. Once temperature is back within standard range, the vehicle can be restarted to clear the error and resume normal operation. • If error persists, please refer to troubleshooting section for error code BMS 14. • If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 15	Battery cells slight temperature difference	• Vehicle has been put into a state of reduced performance while cell temperatures return to normal. Once temperature is back within standard range, the error will automatically clear and normal operation will resume. • If error persists, please refer to troubleshooting section for error code BMS 15. • If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 16	Battery cells severe temperature difference	• Vehicle has been disabled while cell temperatures return to normal. This can take up to [Display Time] hours. Once temperature is back within

Error codes	Error contents	Immediate fix solution during operation
		standard range, the vehicle can be restarted to clear the error and resume operation. • If error persists, please refer to troubleshooting section for error code BMS 16. • If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 17	Battery cells slight overvoltage	• Please stop charging. This action should correct and clear the error automatically. • If error persists, please refer to troubleshooting section for error code BMS 17. • If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 18	Battery cells severe overvoltage	• Please stop charging. This action should correct and clear the error automatically. • If error persists, please refer to troubleshooting section for error code BMS 18. • If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 19	Battery cells slight undervoltage	• Please stop using the vehicle and begin charging. Once vehicle has been charged and cell voltage is within standard range, the error will automatically clear. The vehicle is put into a state of reduced performance while error is present. • If error persists, please refer to troubleshooting section for error code BMS 19. • If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 21	Battery cells severe undervoltage	• Please stop using the vehicle and begin charging. • If error persists, please refer to troubleshooting section for error code BMS 21. • If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 23	Insulation resistance severe insufficient	• Please discontinue use of the vehicle, • If error persists, please refer to troubleshooting section for error code BMS 23. • If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 24	Battery discharge slight overcurrent	• Vehicle has been put into a state of reduced performance while discharge current high. Attempt to reduce vehicle load. Once current is back within

Error codes	Error contents	Immediate fix solution during operation
		standard range, the error will automatically clear and normal operation will resume. • If error persists, please refer to troubleshooting section for error code BMS 24. • If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 25	Battery discharge severe overcurrent	• Vehicle has been disabled. Attempt to reduce vehicle load. Once discharge current is back within standard range, the vehicle can be restarted to clear the error and resume operation. • If error persists, please refer to troubleshooting section for error code BMS 25. • If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 26	Battery cells voltage slight difference	• Please charge vehicle. This action should correct and clear the error. If error persists, please contact dealer for after-sales service. Vehicle has been put into a state of reduced performance while cell voltages are different. • If error persists, please refer to troubleshooting section for error code BMS 26. • If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 27	Battery cells voltage severe difference	• Please discontinue use of the vehicle and begin charging. • If error persists, please refer to troubleshooting section for error code BMS 27. • If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 28	Battery slight overvoltage	• Please stop charging. This action should correct and clear the error automatically. Vehicle is put into a state of reduced performance while error is present. • If error persists, please refer to troubleshooting section for error code BMS 28. • If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 29	Battery severe overvoltage	• Please stop charging. Vehicle is disabled while error is present. • If error persists, please refer to troubleshooting section for error code BMS 29.

Error codes	Error contents	Immediate fix solution during operation
		• If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 31	Battery slight undervoltage	• Please charge vehicle. This action should correct and clear the error automatically. Vehicle has been put into a state of reduced performance while cell voltages are different. • If error persists, please refer to troubleshooting section for error code BMS 31. • If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 32	Battery severe undervoltage	• Please discontinue use of the vehicle, and begin charging. • If error persists, please refer to troubleshooting section for error code BMS 32. • If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 33	Battery charging slight overtemp	• Charging performance reduced while temperature is high. Once temperature is within standard range error will automatically clear and normal charging operation will resume. • If error persists, please refer to troubleshooting section for error code BMS 33. • If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 34	Battery charging severe overtemp	• Please stop charging and allow unit to cool down. • If error persists, please refer to troubleshooting section for error code BMS 34. • If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 35	Charging port slight overtemp	• Charging performance reduced while temperature is high. Once temperature is within standard range error will automatically clear and normal charging operation will resume. • If error persists, please refer to troubleshooting section for error code BMS 35. • If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 36	Charging port severe overtemp	• Please stop charging and allow charge port to cool down. Check for any debris that may be in charging port or plug and clear if present.

Error codes	Error contents	Immediate fix solution during operation
		• If error persists, please refer to troubleshooting section for error code BMS 36. • If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 37	Discharging B+ contactor welded	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code BMS 37. • If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 38	Battery B- contactor welded	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code BMS 38. • If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 39	Battery charging contactor welded	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code BMS 39. • If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 41	Battery heater contactor welded	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code BMS 41. • If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 42	Battery current sensor abnormal	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code BMS 42. • If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 43	Battery sampling chip abnormal	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code BMS 43. • If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 44	Battery cell open circuit	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code BMS 44. • If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 45	Master and slave chips abnormal	• Please restart vehicle.

Error codes	Error contents	Immediate fix solution during operation
		• If error persists, please refer to troubleshooting section for error code BMS 45. • If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 47	Charger CAN communication timeout	• Please attempt to reinsert and ensure charging connector is fully seated. Ensure use of a known good charger. • If error persists, please refer to troubleshooting section for error code BMS 47. • If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 48	Battery precharge failed	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code BMS 48. • If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 49	Battery 12V abnormal	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code BMS 49. • If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 51	Battery heater abnormal	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code BMS 51. • If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 52	Battery CC2 detection abnormal	• Please attempt to reinsert and ensure charging connector is fully seated. Ensure use of a known good charger. Check for any debris that may be in charging port or plug and clear if present. • If error persists, please refer to troubleshooting section for error code BMS 52. • If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 53	Battery B+ contactor coil short	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code BMS 53. • If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 54	Battery B- contactor coil short	• Please restart vehicle.

Error codes	Error contents	Immediate fix solution during operation
		• If error persists, please refer to troubleshooting section for error code BMS 54. • If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 55	Battery precharge contactor coil short	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code BMS 55. • If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 56	Battery charge contactor coil short	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code BMS 56. • If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 57	Battery heating contactor coil short	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code BMS 57. • If error persists after completing the above inspections, contact dealer for after-sales service.
BMS 58	Battery continuous discharge overcurrent	• Vehicle has been put into a state of reduced performance while discharge current high. Attempt to reduce vehicle load. Once current is back within standard range, the error will automatically clear and normal operation will resume. • If error persists, please refer to troubleshooting section for error code BMS 58. • If error persists after completing the above inspections, contact dealer for after-sales service.

Table 3 battery charger error code

Error codes	Error contents	User's operation suggestions
BC 11	Input power undervoltage	• Please stop charging and restart charger. Ensure use of a known good charger. • If error persists, please refer to troubleshooting section for error code BC 11. • If error persists after completing the above inspections, contact dealer for after-sales service.
BC 12	Input power overvoltage	• Please stop charging and restart charger. Ensure use of a known good charger. • If error persists, please refer to troubleshooting section for error code BC 12.

Error codes	Error contents	User's operation suggestions
		• If error persists after completing the above inspections, contact dealer for after-sales service.
BC 13	Output undervoltage	• Please stop charging and restart charger. Ensure use of a known good charger. • If error persists, please refer to troubleshooting section for error code BC 13. • If error persists after completing the above inspections, contact dealer for after-sales service.
BC 14	Output overvoltage	• Please stop charging and restart charger. Ensure use of a known good charger. • If error persists, please refer to troubleshooting section for error code BC 14. • If error persists after completing the above inspections, contact dealer for after-sales service.
BC 15	Output overcurrent	• Please stop charging and restart charger. Ensure use of a known good charger. • If error persists, please refer to troubleshooting section for error code BC 15. • If error persists after completing the above inspections, contact dealer for after-sales service.
BC 16	Charger overtemp	• Charger performance reduced while temperature is high. Once temperature is within standard range error will automatically clear and normal charging operation will resume. • If error persists, please refer to troubleshooting section for error code BC 16. • If error persists after completing the above inspections, contact dealer for after-sales service.
BC 17	Output short circuit	• Please discontinue charging. Ensure use of a known good charger. • If error persists, please refer to troubleshooting section for error code BC 17. • If error persists after completing the above inspections, contact dealer for after-sales service.
BC 18	Battery output polarity reversal	• Please discontinue charging. Ensure use of a known good charger. • If error persists, please refer to troubleshooting section for error code BC 18. • If error persists after completing the above inspections, contact dealer for after-sales service.

Error codes	Error contents	User's operation suggestions
BC 19	No battery output voltage	• Please attempt to reinsert and ensure charging connector is fully seated. Ensure use of a known good charger. Check for any debris that may be in charging port or plug and clear if present. • If error persists, please refer to troubleshooting section for error code BC 19. • If error persists after completing the above inspections, contact dealer for after-sales service.
BC 21	Non-load	• Please attempt to reinsert and ensure charging connector is fully seated. Ensure use of a known good charger. Check for any debris that may be in charging port or plug and clear if present. • If error persists, please refer to troubleshooting section for error code BC 21. • If error persists after completing the above inspections, contact dealer for after-sales service.
BC 22	CAN communication abnormal	• Please attempt to reinsert and ensure charging connector is fully seated. Ensure use of a known good charger. Check for any debris that may be in charging port or plug and clear if present. If error persists, discontinue use of the vehicle and contact dealer for after-sales service.
BC 23	Internal communication abnormal	• Please attempt to reinsert and ensure charging connector is fully seated. Ensure use of a known good charger. Check for any debris that may be in charging port or plug and clear if present. If error persists, discontinue use of the vehicle and contact dealer for after-sales service.
BC 24	Charger CC1 abnormal	• Please attempt to reinsert and ensure charging connector is fully seated. Ensure use of a known good charger. Check for any debris that may be in charging port or plug and clear if present. If error persists, discontinue use of the vehicle and contact dealer for after-sales service.

Table 4 right wheel motor controller error code

Error codes	Error contents	User's operation suggestions
TR 12	Right Wheel Motor Controller Overcurrent	• Please restart vehicle and attempt to reduce load. Vehicle is disabled while error is present. • If error persists, please refer to troubleshooting section for error code TR 12.

Error codes	Error contents	User's operation suggestions
		• If error persists after completing the above inspections, contact dealer for after-sales service.
TR 13	Right Wheel Motor Controller Current Sensor Abnormal	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code TR 13. • If error persists after completing the above inspections, contact dealer for after-sales service.
TR 14	Right Wheel Motor Controller Precharge Failed	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code TR 14. • If error persists after completing the above inspections, contact dealer for after-sales service.
TR 15	Right Wheel Motor Controller Severe Undertemp	• Please ensure ambient temperature is above -40° F and restart vehicle. • If error persists, please refer to troubleshooting section for error code TR 15. • If error persists after completing the above inspections, contact dealer for after-sales service.
TR 16	Right Wheel Motor Controller Severe Overtemp	• Please allow motor controller to cool and restart vehicle. Attempt to reduce load on right wheel. • If error persists, please refer to troubleshooting section for error code TR 16. • If error persists after completing the above inspections, contact dealer for after-sales service.
TR 19	Right Wheel Motor Controller Speed Limit Supervision	• Right wheel speed is faster than vehicle max speed. Please restart vehicle and ensure vehicle is operating withing standard speed range. • If error persists, please refer to troubleshooting section for error code TR 19. • If error persists after completing the above inspections, contact dealer for after-sales service.
TR 1A	Right Wheel Motor Not Stopped	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code TR 1A. • If error persists after completing the above inspections, contact dealer for after-sales service.
TR 1D	Right Wheel Motor Controller Reset Rejected	• Please restart vehicle. If error persists, discontinue use of the vehicle and contact dealer for after-sales service. Vehicle is disabled while error is present.

Error codes	Error contents	User's operation suggestions
TR 1E	Right Wheel Motor Short	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code TR 1E. • If error persists after completing the above inspections, contact dealer for after-sales service.
TR 22	Right Wheel Motor Controller Overtemp Cutback	• Vehicle has been put into a state of reduced performance while motor controller temperature high. Attempt to reduce vehicle load and allow controller to cool. Once temperature is back within standard range, restart the vehicle and normal operation will resume. • If error persists, please refer to troubleshooting section for error code TR 22. • If error persists after completing the above inspections, contact dealer for after-sales service.
TR 25	Right Wheel Motor Controller Ext 5V Supply Failure	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code TR 25. • If error persists after completing the above inspections, contact dealer for after-sales service.
TR 26	Right Wheel Motor Controller Ext 12V Supply Failure	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code TR 26. • If error persists after completing the above inspections, contact dealer for after-sales service.
TR 28	Right Wheel Motor Slight Overtemp	• Vehicle has been put into a state of reduced performance while motor temperature high. Attempt to reduce vehicle load and allow motor to cool. Once temperature is back within standard range, restart the vehicle and normal operation will resume. • If error persists, please refer to troubleshooting section for error code TR 28. • If error persists after completing the above inspections, contact dealer for after-sales service.
TR 29	Right Wheel Motor Temperature Sensor Abnormal	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code TR 29. • If error persists after completing the above inspections, contact dealer for after-sales service.

Error codes	Error contents	User's operation suggestions
TR 31	Main Contactor Coil Driver Short /Open	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code TR 31. • If error persists after completing the above inspections, contact dealer for after-sales service.
TR 36	Right Wheel Motor Sin/Cos Encoder Abnormal	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code TR 36. • If error persists after completing the above inspections, contact dealer for after-sales service.
TR 37	Right Wheel Motor Phase Open	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code TR 37. • If error persists after completing the above inspections, contact dealer for after-sales service.
TR 38	Main Contactor Welded	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code TR 38. • If error persists after completing the above inspections, contact dealer for after-sales service.
TR 39	Main Contactor Did Not Close	• Please restart vehicle. If error persists, discontinue use of the vehicle and contact dealer for after-sales service. Vehicle is disabled while error is present.
TR 3A	Right Wheel Motor Controller Setup Needed	• Please restart vehicle. If error persists, discontinue use of the vehicle and contact dealer for after-sales service. Vehicle is disabled while error is present.
TR 41	Right Throttle Wiper High	• Please check throttle connection and restart vehicle. If error persists, discontinue use of the vehicle and contact dealer for after-sales service. Vehicle is disabled while error is present.
TR 42	Right Throttle Input Abnormal	• Please check throttle connection and restart vehicle. • If error persists, please refer to troubleshooting section for error code TR 42. • If error persists after completing the above inspections, contact dealer for after-sales service.
TR 43	Right Pot2 Wiper High	• Please check throttle connection and restart vehicle.

Error codes	Error contents	User's operation suggestions
		• If error persists, please refer to troubleshooting section for error code TR 43. • If error persists after completing the above inspections, contact dealer for after-sales service.
TR 46	Right Wheel Motor Controller NV Memory Failure	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code TR 46. • If error persists after completing the above inspections, contact dealer for after-sales service.
TR 51	Display CAN Communication Abnormal	• Please restart vehicle. If error persists, discontinue use of the vehicle and contact dealer for after-sales service. Vehicle is disabled while error is present.
TR 52	Left Wheel Motor Controller CAN Communication Abnormal	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code TR 52. • If error persists after completing the above inspections, contact dealer for after-sales service.
TR 53	Vehicle Initial State Detection Abnormal	• The right parking switch is not in parked position. Please return the right lever to the park position to enable operation. • The left parking switch is not in parked position. Please return the left lever to the park position to enable operation. • The PTO Switch (Blade Switch) is not in OFF position. Please ensure PTO switch is pressed into the off position. To enable operation. • Right side throttle lever is not in neutral position. Please ensure right throttle lever is in neutral position to enable operation. • Left side throttle lever is not in neutral position. Please ensure left throttle lever is in neutral position to enable operation. • If error persists, please refer to troubleshooting section for error code TR 53. • If error persists after completing the above inspections, contact dealer for after-sales service.
TR 55	BMS CAN Communication Abnormal	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code TR 55.

Error codes	Error contents	User's operation suggestions
		• If error persists after completing the above inspections, contact dealer for after-sales service.
TR 56	Operator Presence Detection Abnormal	• The operator is not in the correct operating position. Please ensure you are in the correct operating position to resume operation. • Right side throttle lever is not in neutral position. Please ensure right throttle lever is in returned to park position to resume operation. • Left side throttle lever is not in neutral position. Please ensure left throttle lever is in returned to park position to resume operation. • If error persists, please refer to troubleshooting section for error code TR 56. • If error persists after completing the above inspections, contact dealer for after-sales service.
TR 58	Right Blade Motor Controller CAN Communication Abnormal	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code TR 58. • If error persists after completing the above inspections, contact dealer for after-sales service.
TR 5A	Internal communication failure	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code TR 5A. • If error persists after completing the above inspections, contact dealer for after-sales service.
TR 5B	Light Parking Brake Manually Disengaged and Not Reset	• Detected right parking brake is not engaged. Please re-engage parking brake. • If error persists, please refer to troubleshooting section for error code TR 5B. • If error persists after completing the above inspections, contact dealer for after-sales service.
TR 61	GPS Module CAN Communication Abnormal	• Please ensure well connection of the CAN communication wire on GPS module. Please restart vehicle. • If error persists, please refer to troubleshooting section for error code TR 61. • If error persists after completing the above inspections, contact dealer for after-sales service.
TR 63	Left Blade Motor Controller CAN Communication Abnormal	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code TR 63.

Error codes	Error contents	User's operation suggestions
		• If error persists after completing the above inspections, contact dealer for after-sales service.
TR 64	Second Left Blade Motor Controller CAN Communication Abnormal	• Please restart vehicle. If error persists, discontinue use of the vehicle and contact dealer for after-sales service. Vehicle is disabled while error is present.
TR 65	Middle Blade Motor Controller CAN Communication Abnormal	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code TR 65. • If error persists after completing the above inspections, contact dealer for after-sales service.
TR 66	Second Right Blade Motor Controller CAN Communication Abnormal	• Please restart vehicle. If error persists, discontinue use of the vehicle and contact dealer for after-sales service. Vehicle is disabled while error is present.
TR 67	Blade Speed Exceeds Limit	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code TR 67. • If error persists after completing the above inspections, contact dealer for after-sales service.
TR 73	Right Wheel Motor Stall Detected	• Please restart vehicle and attempt to reduce load. • If error persists, please refer to troubleshooting section for error code TR 73. • If error persists after completing the above inspections, contact dealer for after-sales service.
TR 77	Right Wheel Motor Controller Supervision Abnormal	• Please restart vehicle. If error persists, discontinue use of the vehicle and contact dealer for after-sales service. Vehicle is disabled while error is present.
TR 79	Right Wheel Motor Controller Supervision Input Check	• Please restart vehicle. If error persists, contact dealer for after-sales service and discontinue use of the vehicle. Vehicle is disabled while error is present.
TR 83	Right Wheel Motor Controller Internal Hardware	• Please restart vehicle. If error persists, discontinue use of the vehicle and contact dealer for after-sales service. Vehicle is disabled while error is present.
TR 87	Right Wheel Motor Controller Motor Characterization Error	• Please restart vehicle. If error persists, discontinue use of the vehicle and contact dealer for after-

Error codes	Error contents	User's operation suggestions
		sales service. Vehicle is disabled while error is present.
TR A1	Rear ETO Contactor Coil Driver Short/Open	• Please restart vehicle. If error persists, discontinue use of the vehicle and contact dealer for after-sales service. Vehicle is disabled while error is present.
TR A2	Right Wheel Motor Controller EM Brake Driver Short/Open	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code TR A2. • If error persists after completing the above inspections, contact dealer for after-sales service.
TR A3	Front ETO Contactor Coil Driver Short/Open	• Please check front ETO port and ensure it is free of debris and restart vehicle. • If error persists, please refer to troubleshooting section for error code TR A3. • If error persists after completing the above inspections, contact dealer for after-sales service.
TR A4	Auto power off Contactor Coil Driver Short/Open	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code TR A4. • If error persists after completing the above inspections, contact dealer for after-sales service.
TR A9	Right Wheel Motor Controller Coil Supply	• Please restart vehicle. If error persists, discontinue use of the vehicle and contact dealer for after-sales service. Vehicle is disabled while error is present.
TR B1	Right Wheel Motor Controller Analog 1 Out of Range	• Please restart vehicle. If error persists, discontinue use of the vehicle and contact dealer for after-sales service. Vehicle is disabled while error is present.
TR D2	Right Wheel Motor Controller Phase PWM Mismatch	• Please restart vehicle. If error persists, discontinue use of the vehicle and contact dealer for after-sales service. Vehicle is disabled while error is present.

Table 5 left wheel motor controller error code

Error codes	Error contents	Immediate fix solution during operation
TL 12	Left wheel motor controller overcurrent	• Please restart vehicle and attempt to reduce load. Vehicle is disabled while error is present. • If error persists, please refer to troubleshooting section for error code TL 12.

Error codes	Error contents	Immediate fix solution during operation
		• If error persists after completing the above inspections, contact dealer for after-sales service.
TL 13	Left wheel motor controller current sensor abnormal	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code TL 13. • If error persists after completing the above inspections, contact dealer for after-sales service.
TL 14	Left wheel motor controller precharge failed	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code TL 14. • If error persists after completing the above inspections, contact dealer for after-sales service.
TL 15	Left wheel motor controller severe undertemp	• Please ensure ambient temperature is above -40° F and restart vehicle. • If error persists, please refer to troubleshooting section for error code TL 15. • If error persists after completing the above inspections, contact dealer for after-sales service.
TL 16	Left wheel motor controller severe overtemp	• Please allow motor controller to cool and restart vehicle. Attempt to reduce load on left wheel. • If error persists, please refer to troubleshooting section for error code TL 16. • If error persists after completing the above inspections, contact dealer for after-sales service.
TL 19	Left wheel motor controller speed limit supervision	• Left wheel speed is faster than vehicle max speed. Please restart vehicle and ensure vehicle is operating withing standard speed range. • If error persists, please refer to troubleshooting section for error code TL 19. • If error persists after completing the above inspections, contact dealer for after-sales service.
TL 1A	Left wheel motor not stopped	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code TL 1A. • If error persists after completing the above inspections, contact dealer for after-sales service.
TL 1D	Left wheel motor controller reset rejected	• Please restart vehicle. If error persists, discontinue use of the vehicle and contact dealer for after-sales service. Vehicle is disabled while error is present.

Error codes	Error contents	Immediate fix solution during operation
TL 1E	Left wheel motor short	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code TL 1E. • If error persists after completing the above inspections, contact dealer for after-sales service.
TL 22	Left wheel motor controller overtemp cutback	• Vehicle has been put into a state of reduced performance while motor controller temperature high. Attempt to reduce vehicle load and allow controller to cool. Once temperature is back within standard range, restart the vehicle and normal operation will resume. • If error persists, please refer to troubleshooting section for error code TL 22. • If error persists after completing the above inspections, contact dealer for after-sales service.
TL 25	Left wheel motor controller Ext 5V supply failure	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code TL 25. • If error persists after completing the above inspections, contact dealer for after-sales service.
TL 26	Left wheel motor controller Ext 12V supply failure	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code TL 26. • If error persists after completing the above inspections, contact dealer for after-sales service.
TL 27	Left Wheel Motor Serve Overtemp	• Please allow motor to cool and restart vehicle. Attempt to reduce load on left wheel. If error persists, discontinue use of the vehicle and contact dealer for after-sales service. Vehicle is disabled while error is present.
TL 28	Left wheel motor slight overtemp	• Vehicle has been put into a state of reduced performance while motor temperature high. Attempt to reduce vehicle load and allow motor to cool. Once temperature is back within standard range, restart the vehicle and normal operation will resume. • If error persists, please refer to troubleshooting section for error code TL 28. • If error persists after completing the above inspections, contact dealer for after-sales service.

Error codes	Error contents	Immediate fix solution during operation
TL 29	Left wheel motor temperature sensor abnormal	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code TL 29. • If error persists after completing the above inspections, contact dealer for after-sales service.
TL 31	Main contactor coil driver short /open	• Please check the wiring on the main contactor coil. Please restart vehicle. • If error persists, please refer to troubleshooting section for error code TL 31. • If error persists after completing the above inspections, contact dealer for after-sales service.
TL 36	Left wheel motor Sin/Cos encoder abnormal	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code TL 36. • If error persists after completing the above inspections, contact dealer for after-sales service.
TL 37	Left wheel motor phase open	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code TL 37. • If error persists after completing the above inspections, contact dealer for after-sales service.
TL 38	Main contactor welded	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code TL 38. • If error persists after completing the above inspections, contact dealer for after-sales service.
TL 39	Main contactor did not close	• Please restart vehicle. If error persists, discontinue use of the vehicle and contact dealer for after-sales service. Vehicle is disabled while error is present.
TL 3A	Left wheel motor controller setup needed	• Please restart vehicle. If error persists, discontinue use of the vehicle and contact dealer for after-sales service. Vehicle is disabled while error is present.
TL 41	Left throttle wiper high	• Please check throttle connection and restart vehicle. If error persists, discontinue use of the vehicle and contact dealer for after-sales service. Vehicle is disabled while error is present.
TL 42	Left throttle input abnormal	• Please check throttle connection and restart vehicle.

Error codes	Error contents	Immediate fix solution during operation
		• If error persists, please refer to troubleshooting section for error code TL 42. • If error persists after completing the above inspections, contact dealer for after-sales service.
TL 43	Left Pot2 wiper high	• Please check throttle connection and restart vehicle. • If error persists, please refer to troubleshooting section for error code TL 43. • If error persists after completing the above inspections, contact dealer for after-sales service.
TL 46	Left wheel motor controller NV memory failure	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code TL 46. • If error persists after completing the above inspections, contact dealer for after-sales service.
TL 52	Right wheel motor controller CAN communication abnormal	• Please check if the CAN communication wire on the left wheel motor controller is well connected. Please restart vehicle. • If error persists, please refer to troubleshooting section for error code TL 52. • If error persists after completing the above inspections, contact dealer for after-sales service.
TL 5A	Internal communication failure	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code TL 5A. • If error persists after completing the above inspections, contact dealer for after-sales service.
TL 5B	Left Parking Brake Manually Disengaged and Not Reset	• Detected left parking brake is not engaged. Please re-engage parking brake. • If error persists, please refer to troubleshooting section for error code TL 5B. • If error persists after completing the above inspections, contact dealer for after-sales service.
TL 73	Left wheel motor stall detected	• Please reduce the load on the left wheel motor. • Please check if the left wheel motor phase wire is well connected. • Please check the encoder of left wheel motor. • Please check if the encoder wiring of the left wheel motor is well connected. • Please restart vehicle and attempt to reduce load.

Error codes	Error contents	Immediate fix solution during operation
		• If error persists, please refer to troubleshooting section for error code TL 73. • If error persists after completing the above inspections, contact dealer for after-sales service.
TL 77	Left wheel motor controller supervision abnormal	• Please restart vehicle. If error persists, discontinue use of the vehicle and contact dealer for after-sales service. Vehicle is disabled while error is present.
TL 79	Left wheel motor controller supervision input check	• Please check if any switch is damaged or water is entered. Please restart vehicle. If error persists, discontinue use of the vehicle and contact dealer for after-sales service. Vehicle is disabled while error is present.
TL 83	Left wheel motor controller internal hardware	• Please restart vehicle. If error persists, discontinue use of the vehicle and contact dealer for after-sales service. Vehicle is disabled while error is present.
TL 87	Left wheel motor controller motor characterization error	• Please restart vehicle. If error persists, discontinue use of the vehicle and contact dealer for after-sales service. Vehicle is disabled while error is present.
TL A2	Left Wheel Motor Controller EM Brake Driver Coil Short/Open	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code TL A2. • If error persists after completing the above inspections, contact dealer for after-sales service.
TL A3	Deck Linear Actuator Driver Up Coil Short/Open	• Please restart vehicle. If error persists, discontinue use of the vehicle and contact dealer for after-sales service. Vehicle is disabled while error is present.
TL A4	Deck Linear Actuator Driver Down Coil Short/Open	• Please restart vehicle. If error persists, discontinue use of the vehicle and contact dealer for after-sales service. Vehicle is disabled while error is present.
TL A9	Left wheel motor controller coil supply	• Please restart vehicle. If error persists, discontinue use of the vehicle and contact dealer for after-sales service. Vehicle is disabled while error is present.
TL B1	Left wheel motor controller analog 1 out of range	• Please restart vehicle. If error persists, discontinue use of the vehicle and contact dealer for after-

Error codes	Error contents	Immediate fix solution during operation
		sales service. Vehicle is disabled while error is present.
TL D2	Left wheel motor controller phase PWM mismatch	• Please restart vehicle. If error persists, discontinue use of the vehicle and contact dealer for after-sales service. Vehicle is disabled while error is present.

Table 6 blade controller error code

Error codes	Error contents	User's operation suggestions
ML 11	Left blade motor controller hardware overvoltage or overcurrent	• Please reduce the blade load and restart the vehicle. Check that blades are free of debris. Blades are disabled while error present. • If error persists, please refer to troubleshooting section for error code ML 11. • If error persists after completing the above inspections, contact dealer for after-sales service.
ML 12	Right blade motor controller overcurrent	• Please reduce the blade load and restart PTO. Check that blades are free of debris. Blades are disabled while error present. • If error persists, please refer to troubleshooting section for error code ML 12. • If error persists after completing the above inspections, contact dealer for after-sales service.
ML 13	Left blade motor controller overvoltage	• Please restart PTO to clear error. Blades are disabled while error present. • If error persists, please refer to troubleshooting section for error code ML 13. • If error persists after completing the above inspections, contact dealer for after-sales service.
ML 14	Left blade motor controller undervoltage	• Please restart PTO to clear error. Blades are disabled while error present. • If error persists, please refer to troubleshooting section for error code ML 14. • If error persists after completing the above inspections, contact dealer for after-sales service.
ML 15	Current Parameter Mismatch Error	• Please restart vehicle. Blades are disabled while error is present. • If error persists, please refer to troubleshooting section for error code ML 15. • If error persists after completing the above inspections, contact dealer for after-sales service.

Error codes	Error contents	User's operation suggestions
ML 16	Left blade motor phase open	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code ML 16. • If error persists after completing the above inspections, contact dealer for after-sales service.
ML 17	Left blade motor controller severe overtemp	• Please reduce the blade load. Allow controller to cool and restart vehicle. Check that blades are free of debris. Blades are disabled until unit restart. • If error persists, please refer to troubleshooting section for error code ML 17. • If error persists after completing the above inspections, contact dealer for after-sales service.
ML 18	Left blade motor controller EEPROM abnormal	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code ML 18. • If error persists after completing the above inspections, contact dealer for after-sales service.
ML 21	Left blade motor stall detected	• Please reduce the blade load and restart the PTO. Check that blades are free of debris. Blades are disabled while error present. • If error persists, please refer to troubleshooting section for error code ML 21. • If error persists after completing the above inspections, contact dealer for after-sales service.
ML 22	Left blade motor system start failure	• Please reduce the blade load and restart the PTO. Check that blades are free of debris. Blades are disabled while error present.
ML 23	Left blade motor controller precharge failed	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code ML 23. • If error persists after completing the above inspections, contact dealer for after-sales service.
ML 24	CAN communication with right wheel motor controller abnormal	• Please restart vehicle. If error persists, discontinue use of the vehicle and contact dealer for after-sales service. Blades are disabled while error is present.
ML 26	Left blade motor controller MOSFET abnormal	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code ML 26. • If error persists after completing the above inspections, contact dealer for after-sales service.

Error codes	Error contents	User's operation suggestions
ML 27	Left blade motor controller temperature sensor abnormal	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code ML 27. • If error persists after completing the above inspections, contact dealer for after-sales service.
ML 28	Left blade motor controller self-check abnormal	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code ML 28. • If error persists after completing the above inspections, contact dealer for after-sales service.
MM 11	Middle Blade Motor Controller Hardware Overvoltage or Overcurrent	• Please reduce the blade load and restart the vehicle. Check that blades are free of debris. Blades are disabled while error present.
MM 12	Middle Blade Motor Controller Overcurrent	• Please reduce the blade load and restart PTO. Check that blades are free of debris. Blades are disabled while error present.
MM 13	Middle Blade Motor Controller Overvoltage	• Please restart PTO to clear error. Blades are disabled while error present.
MM 14	Middle Blade Motor Controller Undervoltage	• Please restart PTO to clear error. Blades are disabled while error present.
MM 16	Middle Blade Motor Phase Open	• Please restart vehicle. If error persists, contact dealer for after-sales service and discontinue use of the vehicle. Blades are disabled while error is present.
MM 17	Middle Blade Motor Controller Severe Overtemp	• Please reduce the blade load. Allow controller to cool and restart vehicle. Check that blades are free of debris. Blades are disabled until unit restart.
MM 18	Middle Blade Motor Controller EEPROM Abnormal	• Please restart vehicle. If error persists, contact dealer for after-sales service and discontinue use of the vehicle. Blades are disabled while error is present.
MM 21	Middle Blade Motor Stall Detected	• Please reduce the blade load and restart the PTO. Check that blades are free of debris. Blades are disabled while error present.
MM 22	Middle Blade Motor System Start Failure	• Please reduce the blade load and restart the PTO. Check that blades are free of debris. Blades are disabled while error present.

Error codes	Error contents	User's operation suggestions
MM 23	Middle Blade Motor Controller Precharge Failed	• Please restart vehicle. If error persists, contact dealer for after-sales service and discontinue use of the vehicle. Blades are disabled while error is present.
MM 24	CAN Communication with Right Wheel Motor Controller Abnormal	• Please restart vehicle. If error persists, contact dealer for after-sales service and discontinue use of the vehicle. Blades are disabled while error is present.
MM 26	Middle Blade Motor Controller MOSFET Abnormal	• Please restart vehicle. If error persists, contact dealer for after-sales service and discontinue use of the vehicle. Blades are disabled while error is present.
MM 27	Middle Blade Motor Controller Temperature Sensor Abnormal	• Please restart vehicle. If error persists, contact dealer for after-sales service and discontinue use of the vehicle. Blades are disabled while error is present.
MM 28	Middle Blade Motor Controller Self-Check Abnormal	• Please restart vehicle. If error persists, contact dealer for after-sales service and discontinue use of the vehicle. Blades are disabled while error is present.

Table 7 blade controller error code

Error codes	Error contents	Immediate fix solution during operation
MR 11	Right blade motor controller hardware overvoltage or overcurrent	• Please reduce the blade load and restart the vehicle. Check that blades are free of debris. Blades are disabled while error present. • If error persists, please refer to troubleshooting section for error code MR 11. • If error persists after completing the above inspections, contact dealer for after-sales service.
MR 12	Right blade motor controller overcurrent	• Please reduce the blade load and restart PTO. Check that blades are free of debris. Blades are disabled while error present. • If error persists, please refer to troubleshooting section for error code MR 12. • If error persists after completing the above inspections, contact dealer for after-sales service.

Error codes	Error contents	Immediate fix solution during operation
MR 13	Right blade motor controller overvoltage	• Please restart PTO to clear error. Blades are disabled while error present. • If error persists, please refer to troubleshooting section for error code MR 13. • If error persists after completing the above inspections, contact dealer for after-sales service.
MR 14	Right blade motor controller undervoltage	• Please restart PTO to clear error. Blades are disabled while error present. • If error persists, please refer to troubleshooting section for error code MR 14. • If error persists after completing the above inspections, contact dealer for after-sales service.
MR 16	Right blade motor phase open	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code MR 16. • If error persists after completing the above inspections, contact dealer for after-sales service.
MR 17	Right blade motor controller severe overtemp	• Please reduce the blade load. Allow controller to cool and restart vehicle. Check that blades are free of debris. Blades are disabled until unit restart. • If error persists, please refer to troubleshooting section for error code MR 17. • If error persists after completing the above inspections, contact dealer for after-sales service.
MR 18	Right blade motor controller EEPROM abnormal	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code MR 18. • If error persists after completing the above inspections, contact dealer for after-sales service.
MR 21	Right blade motor stall detected	• Please reduce the blade load and restart the PTO. Check that blades are free of debris. Blades are disabled while error present. • If error persists, please refer to troubleshooting section for error code MR 21. • If error persists after completing the above inspections, contact dealer for after-sales service.
MR 22	Right blade motor system start failure	• Please reduce the blade load and restart the PTO. Check that blades are free of debris. Blades are disabled while error present.
MR 23	Right blade motor controller precharge failed	• Please restart vehicle.

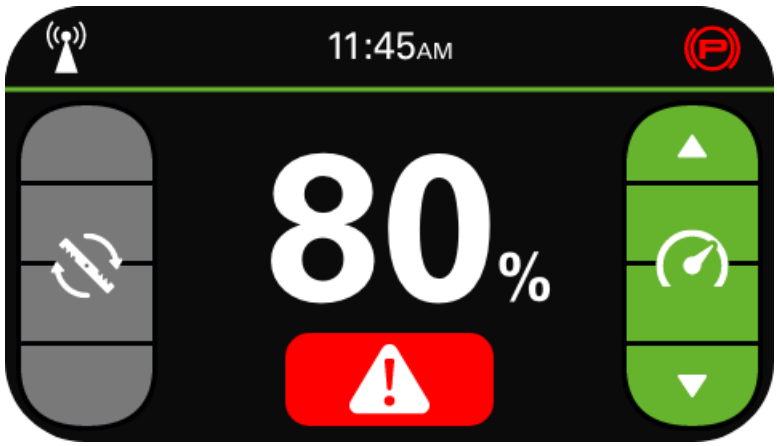
Error codes	Error contents	Immediate fix solution during operation
		• If error persists, please refer to troubleshooting section for error code MR 23. • If error persists after completing the above inspections, contact dealer for after-sales service.
MR 24	CAN communication with right wheel motor controller abnormal	• Please restart vehicle. If error persists, contact dealer for after-sales service and discontinue use of the vehicle. Blades are disabled while error is present.
MR 26	Right blade motor controller MOSFET abnormal	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code MR 26. • If error persists after completing the above inspections, contact dealer for after-sales service.
MR 27	Right blade motor controller temperature sensor abnormal	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code MR 27. • If error persists after completing the above inspections, contact dealer for after-sales service.
MR 28	Right blade motor controller self-check abnormal	• Please restart vehicle. • If error persists, please refer to troubleshooting section for error code MR 28. • If error persists after completing the above inspections, contact dealer for after-sales service.

Table 8 front attachment controller error code

Error codes	Error contents	Immediate fix solution during operation
FA xx	Front attachment error	• Please refer to the manual of correspond attachment device for details.

4.1.3 Reading the Error Code (on the Display Screen)

See 3.3.2 Display screen for detailed information.



4.1.4 Reading the Error Code (Controller Status LEDs)

If the display screen is damaged and the error code cannot be read, the operator can obtain the error code by observing the error codes issued by the controller status LEDs.

4.1.4.1 Traction Drive Controller

DIAGNOSTICS

Diagnostics information can be obtained as following: by observing the error codes issued by the Status LEDs.

The status indicator is a translucent window on the cover, which is displayed as blue or red LEDs. Its illumination indicates the following information:

Status LEDs	Indication
Off	Controller is not powered on, or is severely damaged.
Blue	Controller is operating normally.
Red flashing pattern	Error code, review the error table.

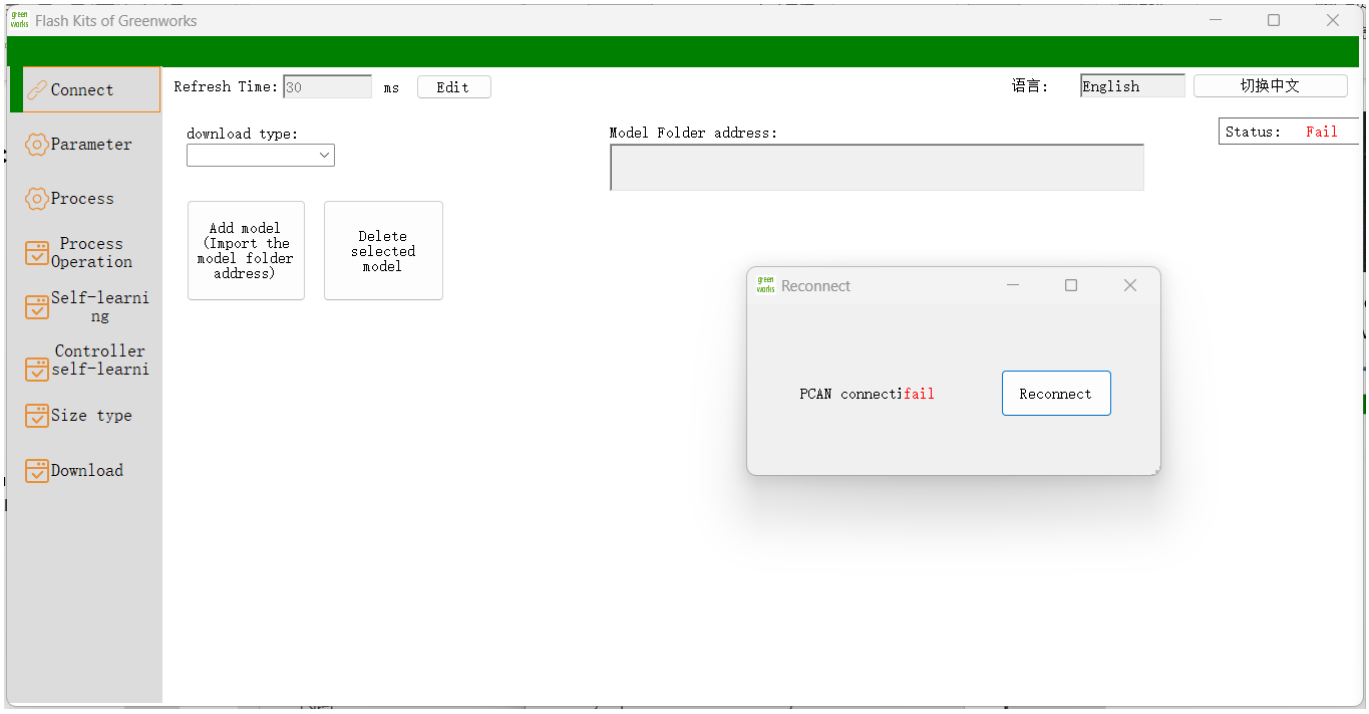
4.2 Program Update

4.2.1 Program Flashing

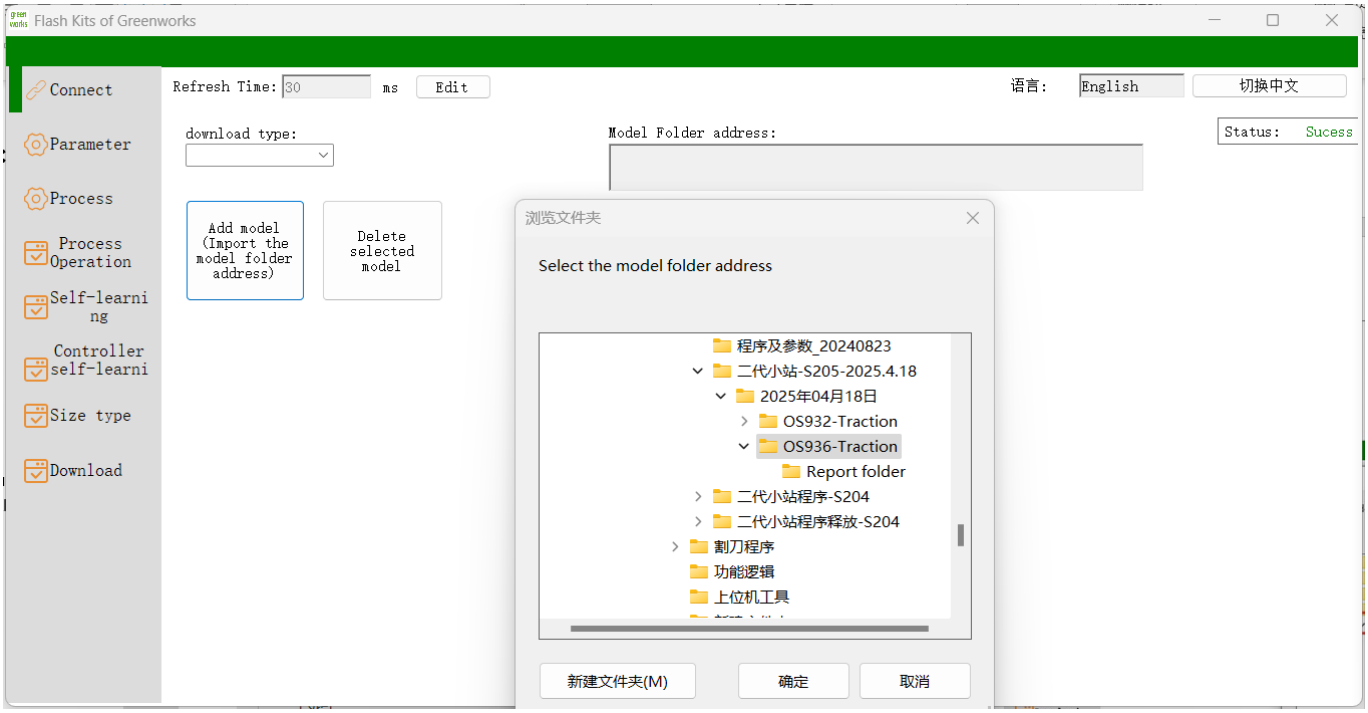
1. Press the power button to power on the vehicle.

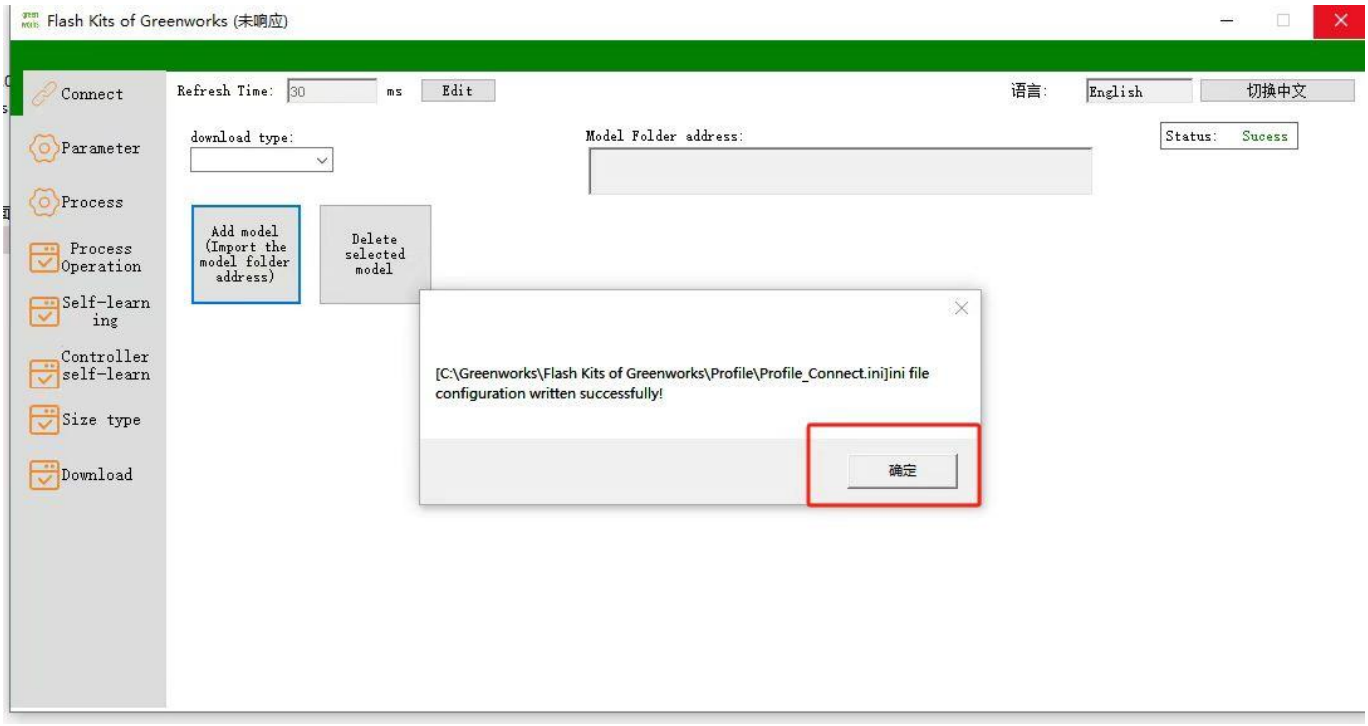
2. Double click the "Flash Kits of GreenWorks" icon on the desktop.

3. You can switch to the current communication setting interface through the “Connect” button on the left. Then click “Status” to connect the host computer with the vehicle communication.

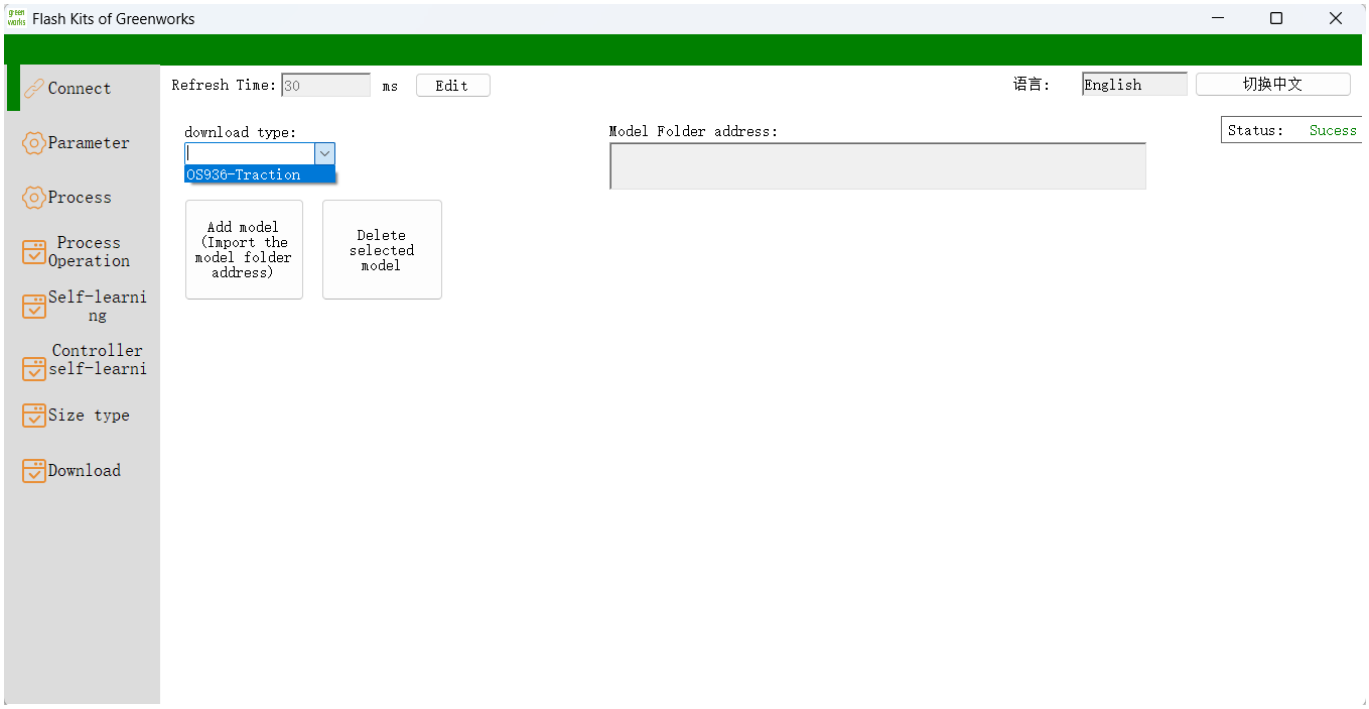


4. Add the program file for the model you want to update the program. Import the model folder address.

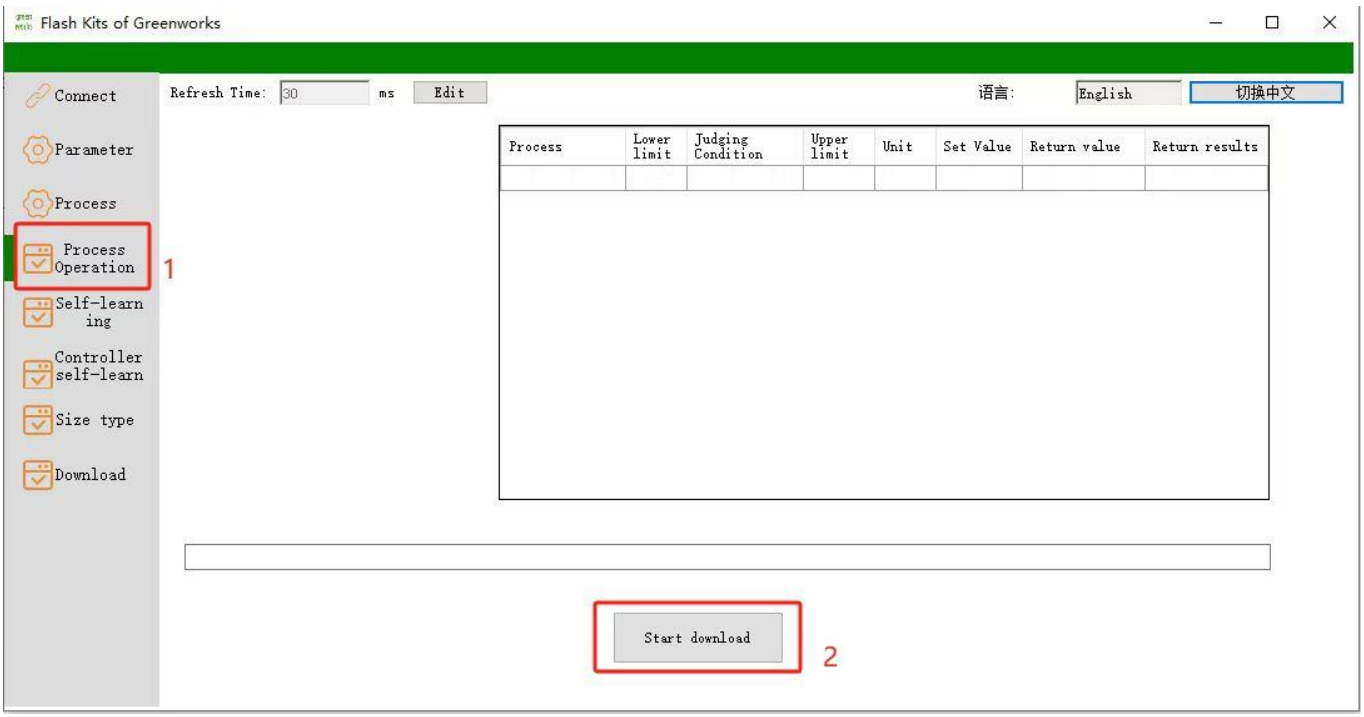




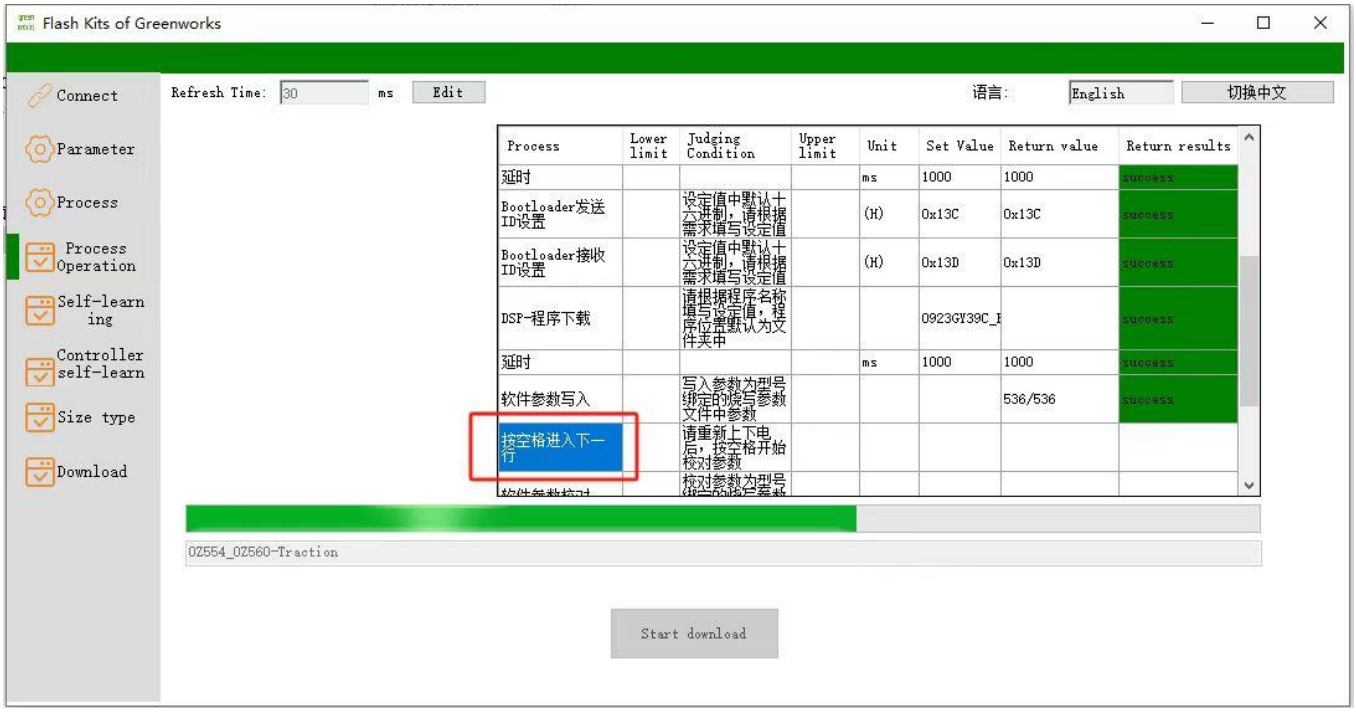
5. Select the correct model program file.



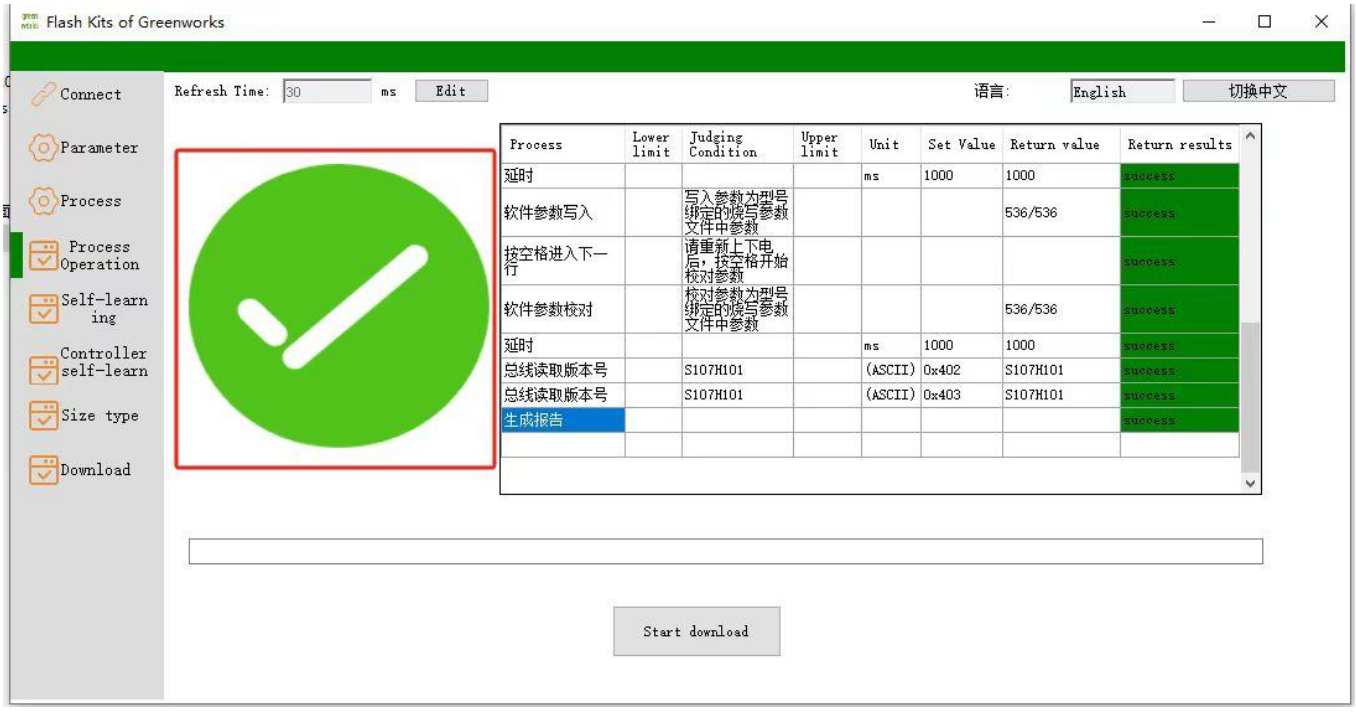
6. Follow steps 1-2 to start the flashing procedure.



7. Wait a few minutes when this location is highlighted and hit the computer spacebar.



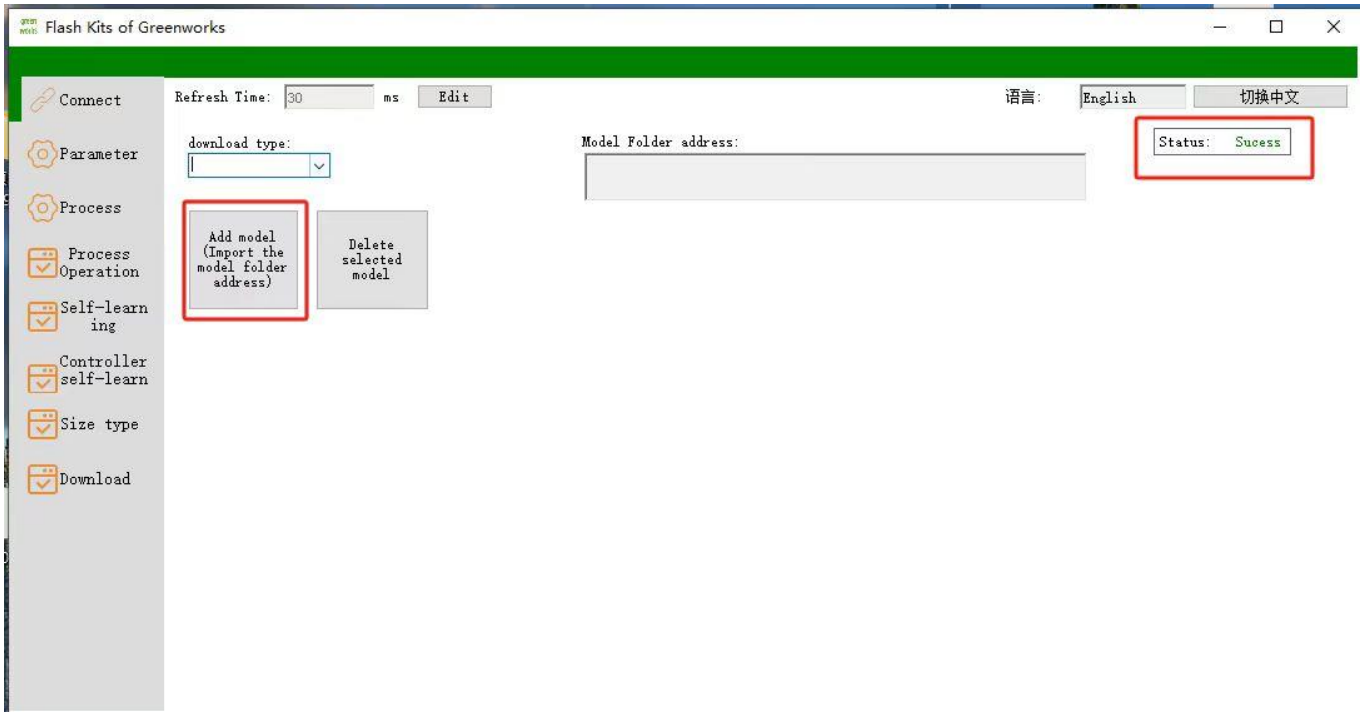
8. When a green √ is displayed, the program flashing is complete.



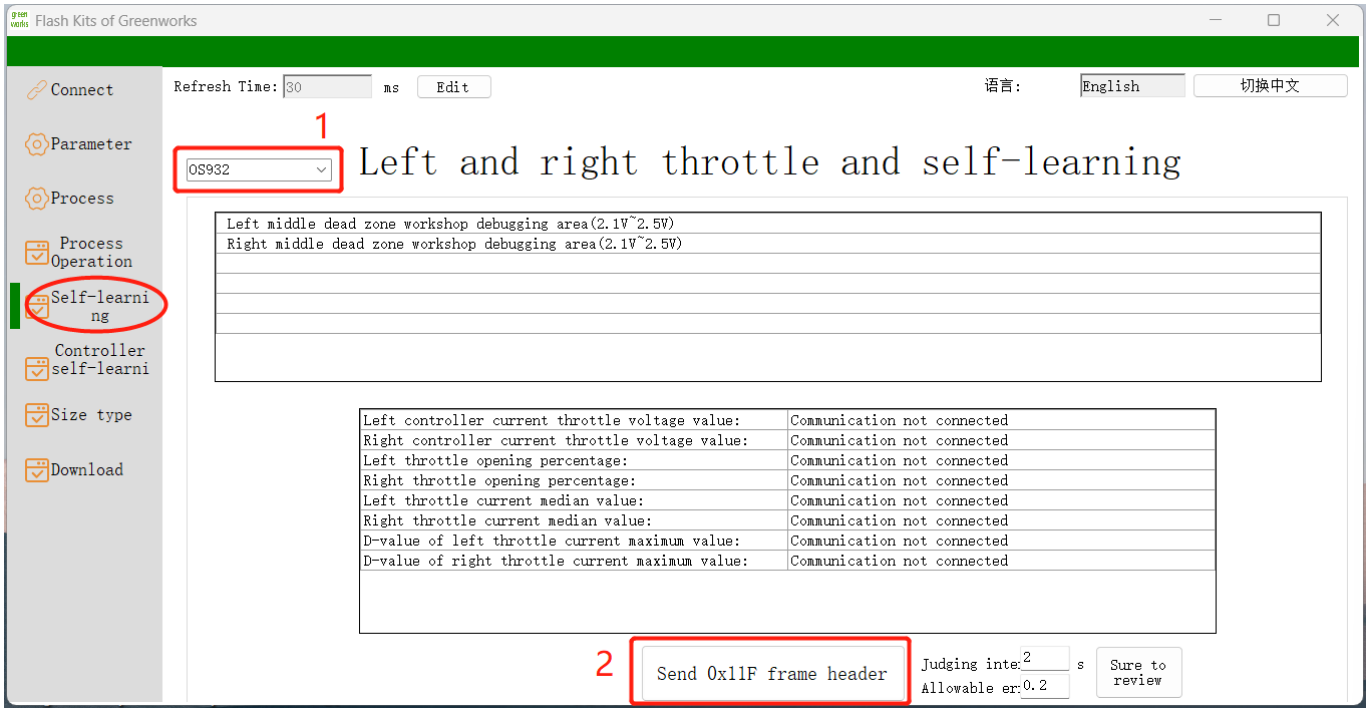
9. Power on to reset.

4.2.2 Throttle Self-Learning

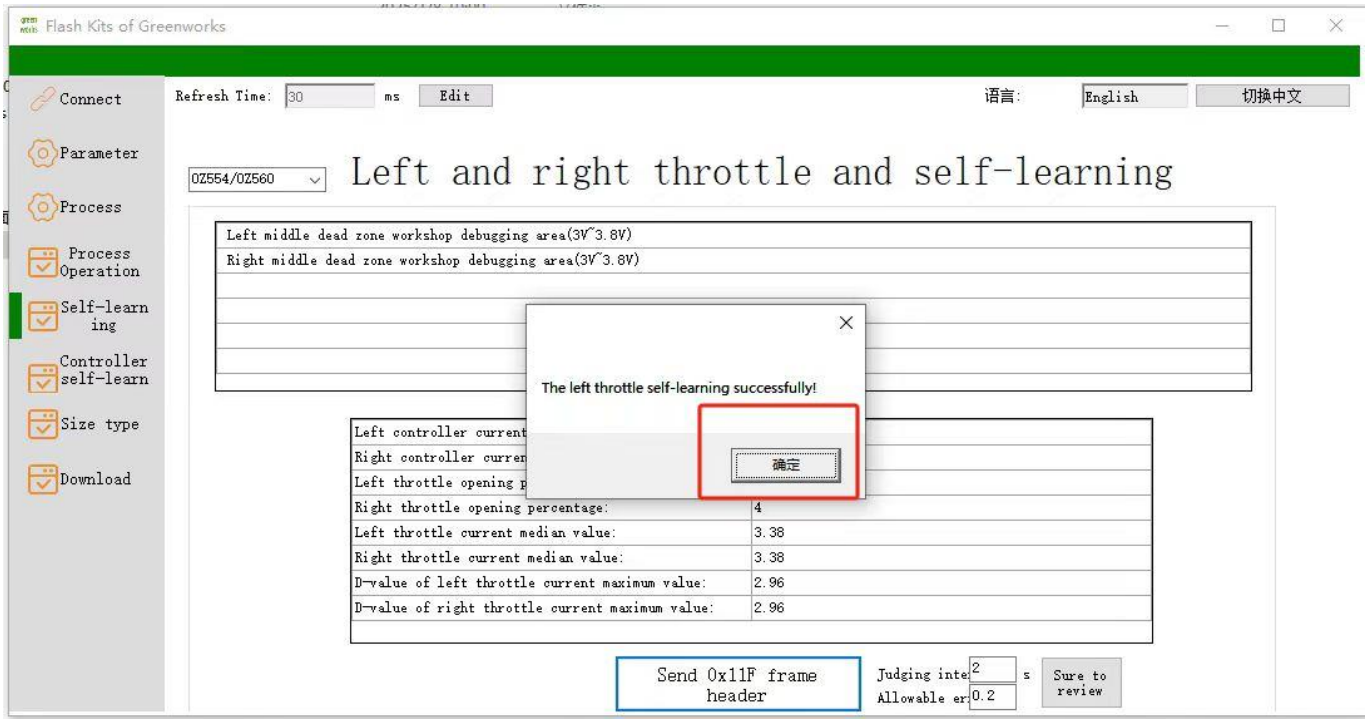
1. After powering on to reset, reconnect to the Gloyel host computer.



2. Go to "Self-learning", then select the corresponding model number from the drop-down menu. Click "Send 0x11F frame header" to start throttle self-learning (the two control levers must be in the park position and the operator must be seated in the mower).



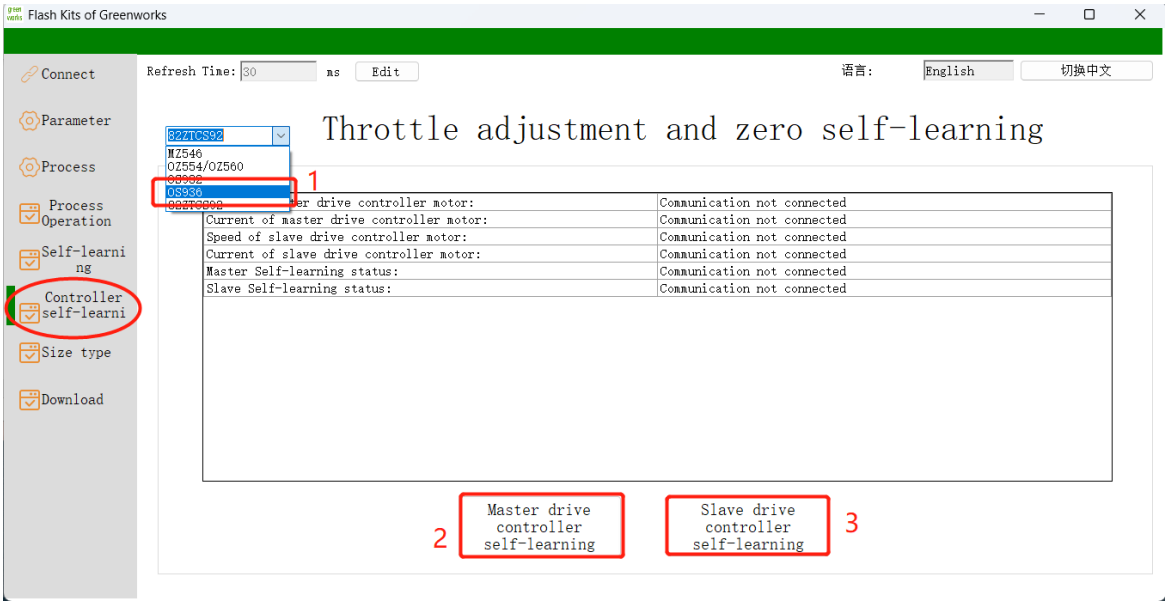
3. "The left throttle self-learning successfully" will appear on the screen. Click OK to complete the throttle self-learning setup.



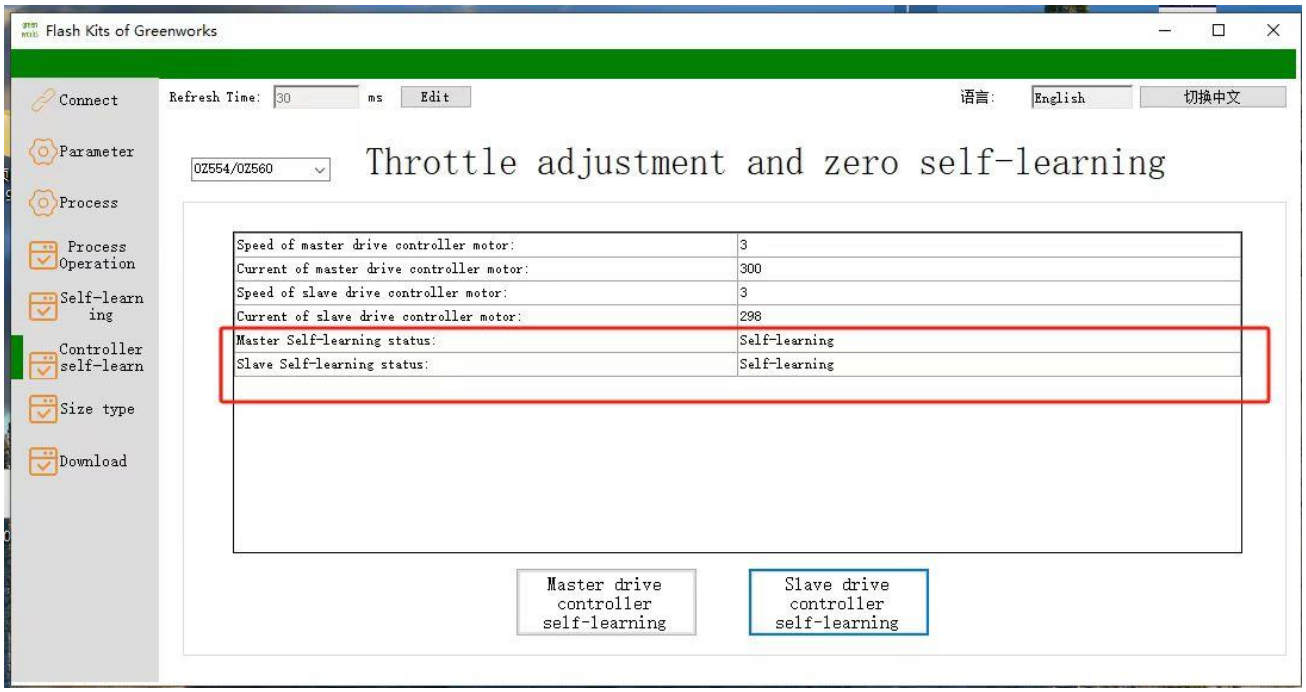
4.2.3 Motor Self-Learning

1. Lift the mower using a forklift and keep the wheels off the ground before the motor self-learning. This helps avoid personal injury. Only after completing the self-learning procedures of two drive motors, you can remove the forklift.

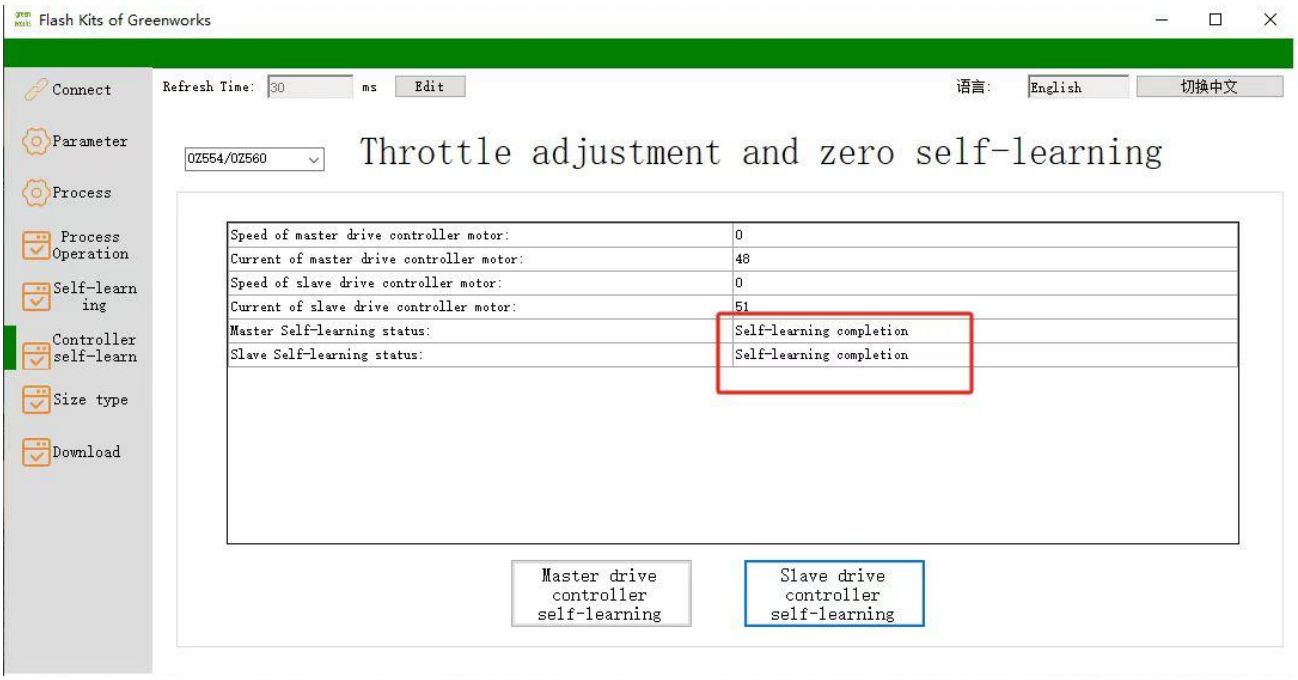
2. Go to "Controller self-learning 1 ", then select the corresponding model number 1 from the drop-down menu. Click "Master drive controller self-learning 2 " and “Slave drive controller self-learning 3” to start the controller self-learning (the two control levers in natural position and the parks are released, the operator must be seated in the mower 4).



3. “Self-learning” means the commissioning test is ongoing.

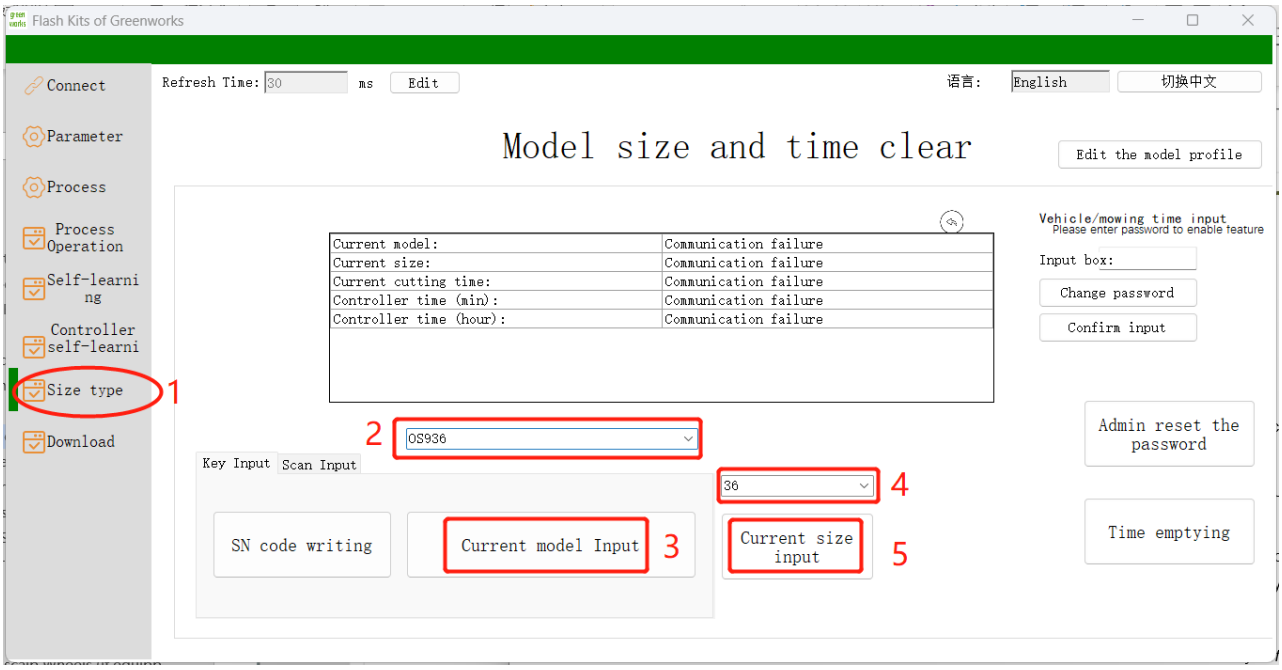


4. “Self-learning completion” means the commissioning test is completed.

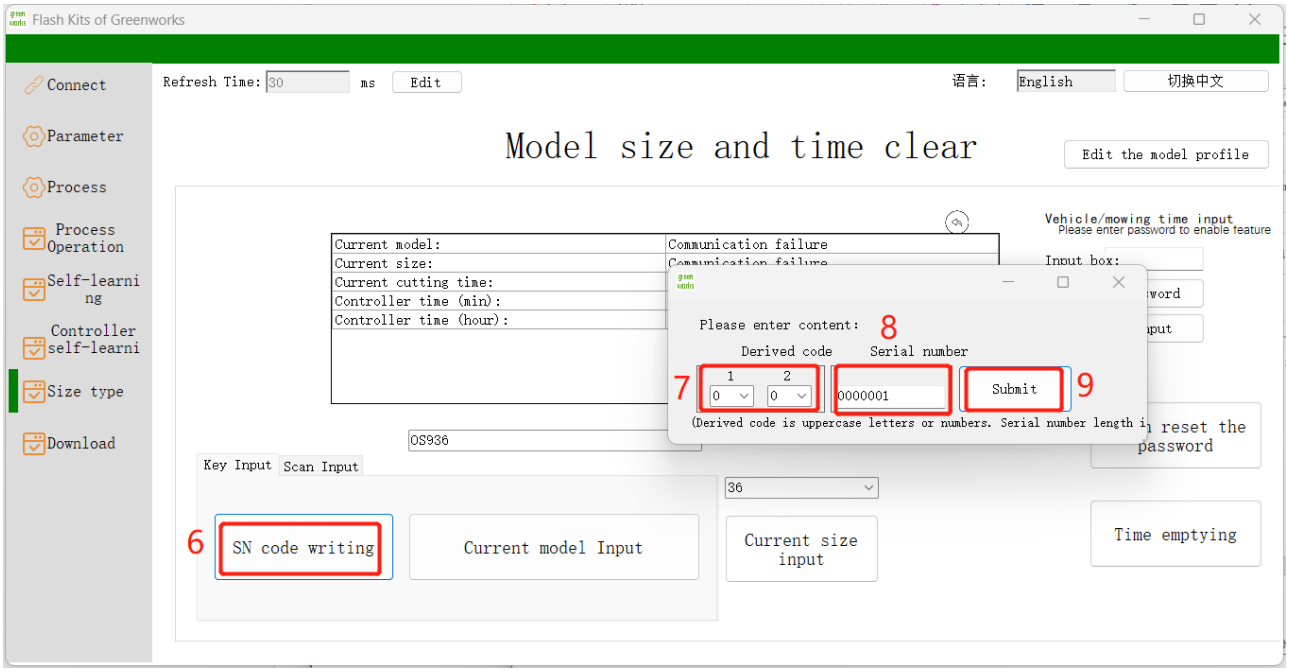


4.2.4 Model and SN Code Entry

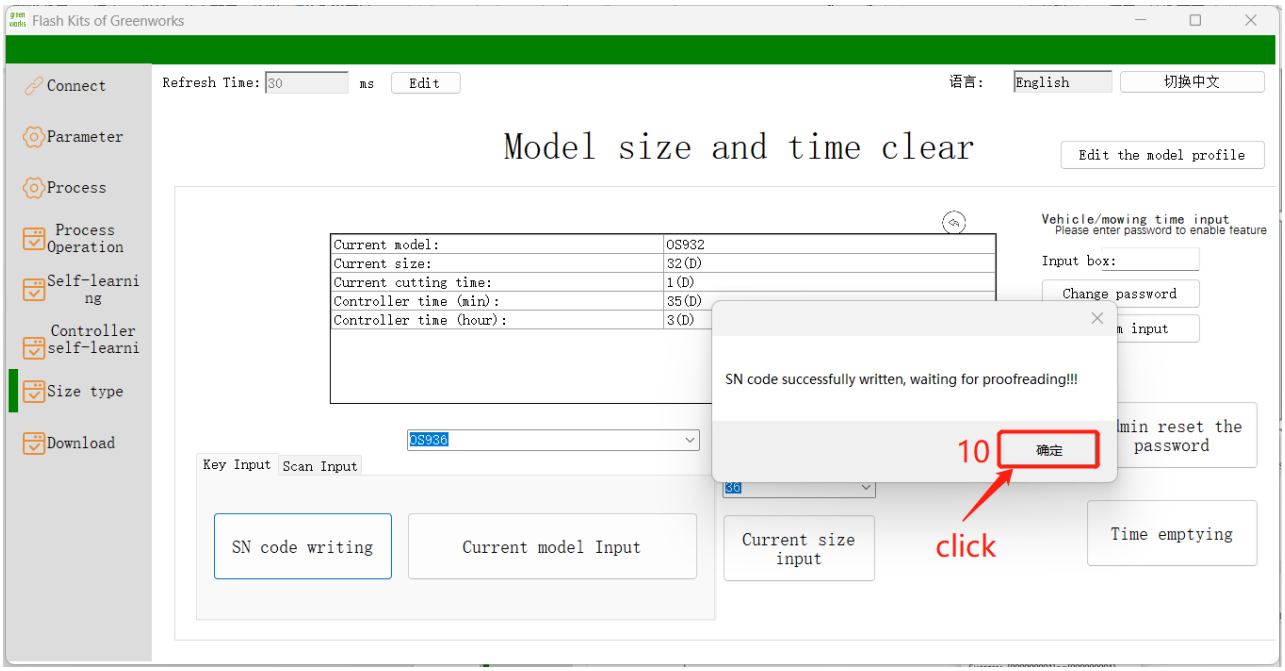
1. Go to "Size type 1". Select the correct model 2 through the dropdown menu and click on "Current model Input 3", then select the deck size of the vehicle, click "Current size input".

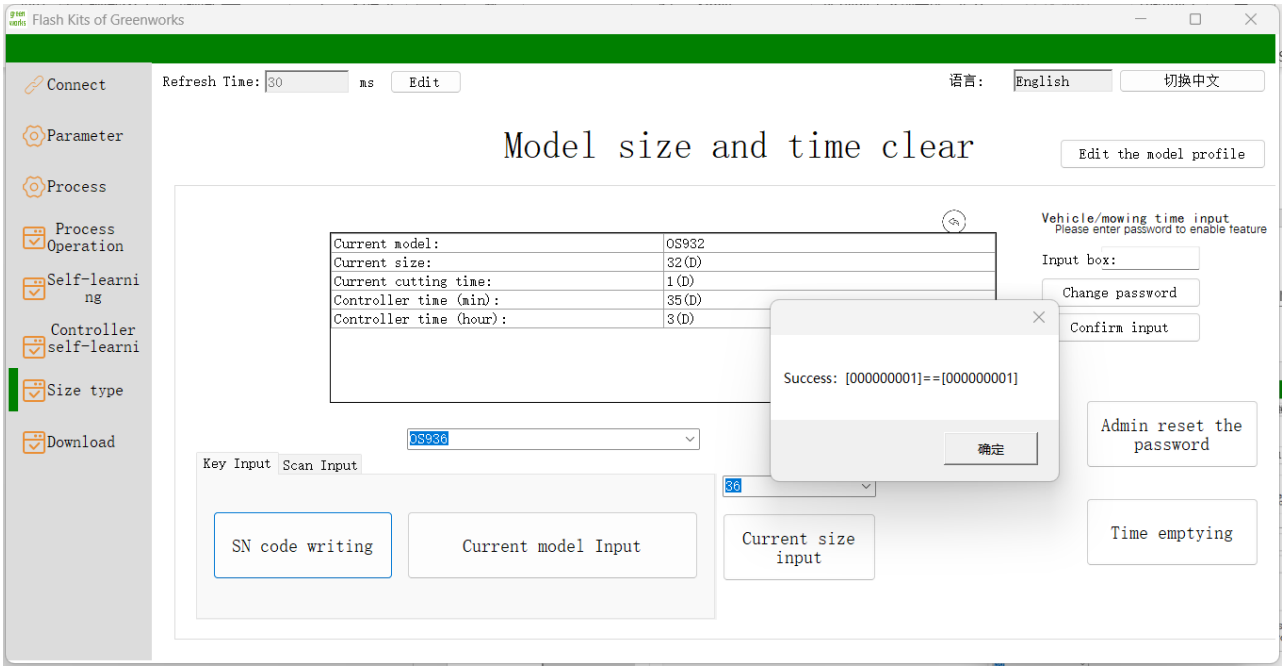


2. click "SN code writing 6", Then enter the Derived code 7 and the Serial number 8, and finally click “Submit 9”.



3. Click button 10 to appear the SN writing success interface.


Flash Kits of Greenworks
Connect
Parameter
Process
Process Operation
Self-learning
Controller self-learni
Size type
Download
Refresh Time: 30 ms Edit
语言: English 切换中文
Model size and time clear
Edit the model profile
Current model: OS932
Current size: 32(D)
Current cutting time: 1(D)
Controller time (min): 35(D)
Controller time (hour): 3(D)
Vehicle/mowing time input
Please enter password to enable feature
Input box:
Change password
input
SN code successfully written, waiting for proofreading!!!
10
确定
click
OS936
Key Input
Scan Input
SN code writing
Current model Input
Current size input
Time emptying
min reset the password


Flash Kits of Greenworks
Connect
Parameter
Process
Process Operation
Self-learning
Controller self-learni
Size type
Download
Refresh Time: 30 ms Edit
语言: English 切换中文
Model size and time clear
Edit the model profile
Current model: OS932
Current size: 32(D)
Current cutting time: 1(D)
Controller time (min): 35(D)
Controller time (hour): 3(D)
Vehicle/mowing time input
Please enter password to enable feature
Input box:
Change password
Confirm input
Success: [000000001]==[000000001]
确定
OS936
Key Input
Scan Input
SN code writing
Current model Input
Current size input
Time emptying
Admin reset the password

4.3 Electrical Components

4.3.1 Switches

Switches either open a circuit to stop current flow or close and allow current to flow through.

- A normally open (NO) switch prevents current flow until the switch is actuated, completing the circuit and allowing current to flow through it.
- A normally closed (NC) switch allows current to flow until the switch is actuated, breaking the circuit and stopping current flow through it.

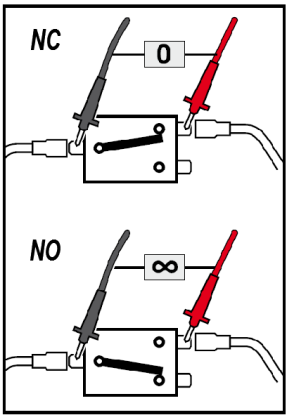
The switches are selected with reference to their nominal current (the contacts must be of sufficient size to carry the required current), rated voltage and type of actuation (pressure switches, traction, rotation, momentary contact or microswitches).

NOTE - *Check that the connections to the switches are stable and that the switch is actuated correctly before performing an electrical test (Safety switches may need adjusting in order to be actuated correctly).*

IMPORTANT - *During the check process, remove the switches from their respective circuit, unplugging the connector. If the cables are left in place, the machine components or the meter may be damaged.*

Normally Open Switch

T test a normally closed switch



1. Connect the ohmmeter between the switch terminals.

   The meter should indicate an open circuit (infinite resistance «∞»).

2. Activate the switch.

   The Ohmmeter should indicate a closed circuit (zero resistance «0»).

   This indicates the switch is operating properly.

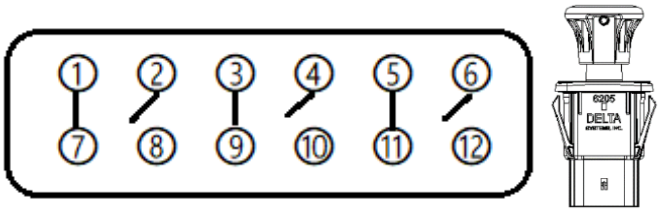
   Variation from test results described indicates a defective switch.

The diagrams show the connections of the electrical components in different situations.

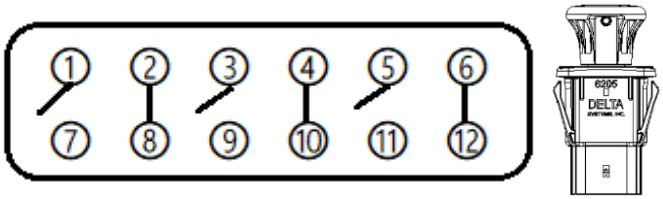
NOTE:

The continuous line indicates the electrical continuity of the circuit. All switches are shown from the rear.

PTO SWITCH

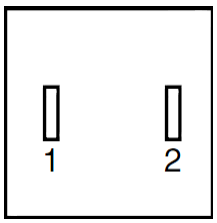


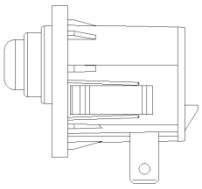
CIRCUITS SHOWN WITH THE KNOB IN THE UP POSITION



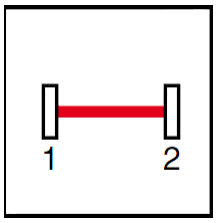
CIRCUITS SHOWN WITH THE KNOB IN THE DOWN POSITION

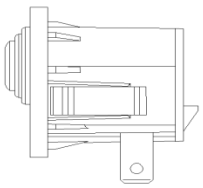
PARK SWITCH





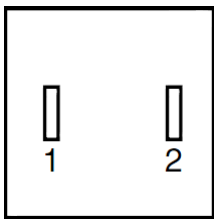
ELECTROMAGNETIC BRAKE ON

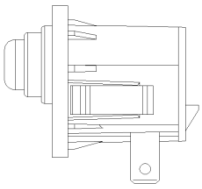




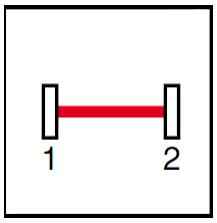
ELECTROMAGNETIC BRAKE OFF

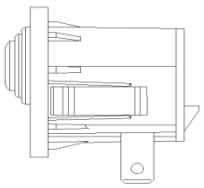
Seat Switch





OPERATOR NOT SEATED





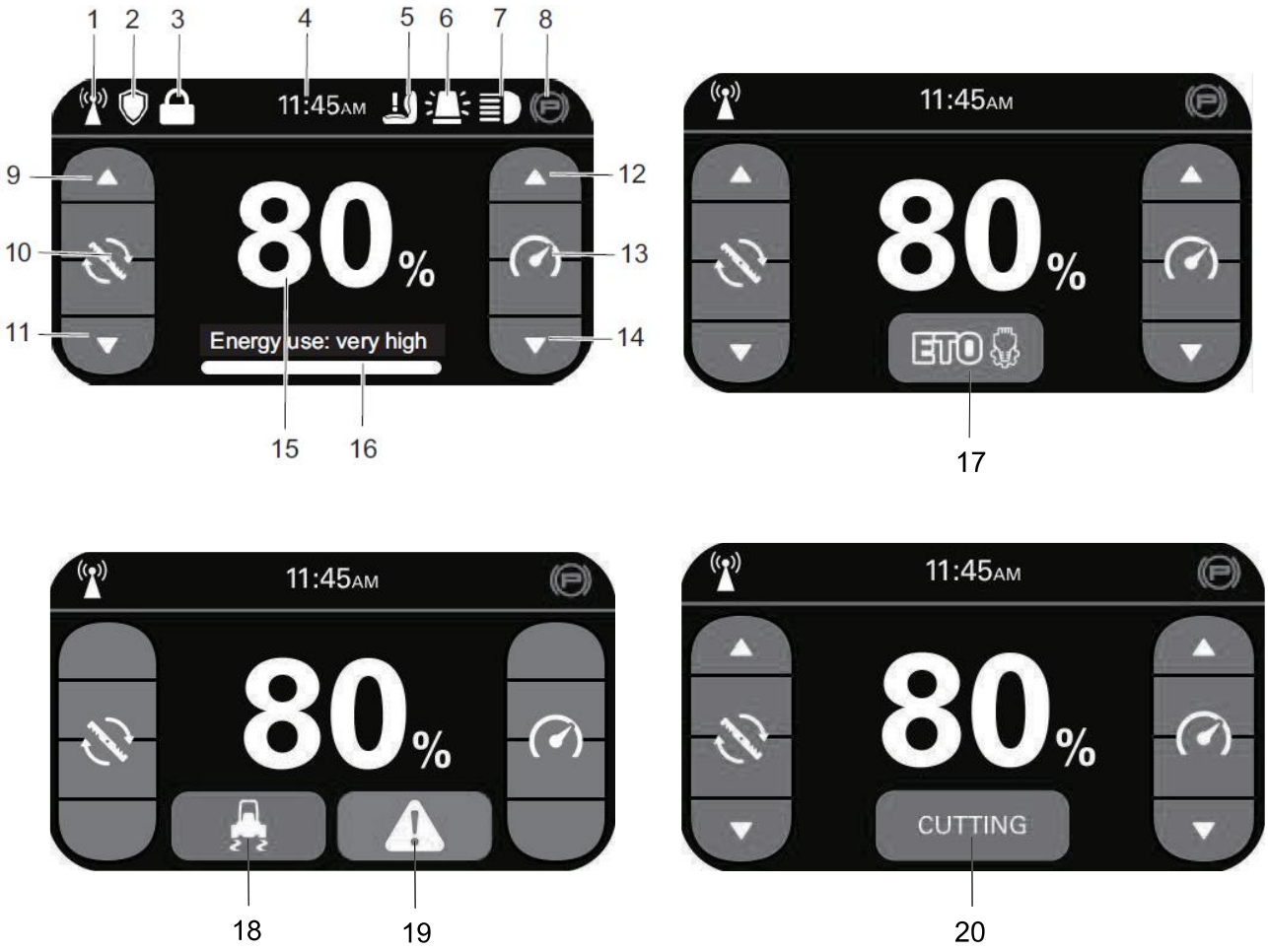
OPERATOR SEATED

POWER OFF

POWER ON

4.3.2 Display Screen

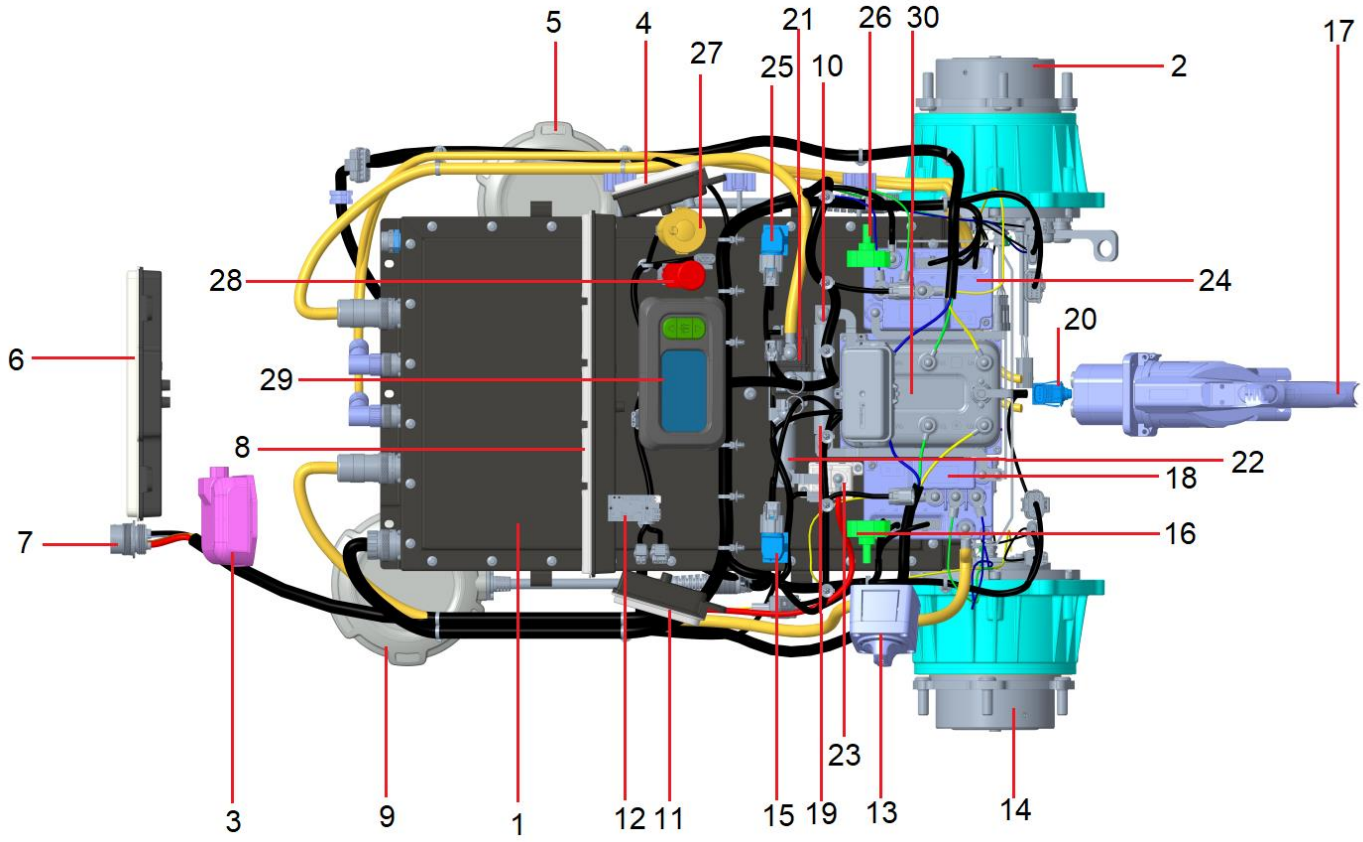
The function of the digital display, located on the control panel, is to provide electrical system information to the operator. It gives detailed information in the form of pattern, codes and number.



#	Name	Function
1		4G GPS signal
2		Security feature is active.
3		Screen-lock. The touch screen ‘s function is disabled.
4	11:45 AM	Time
5		User presence needed to operate machine.

6		Warning light is on.
7		LED light is on.
8		The parking brake is engaged.
9		Increase blade speed. The blade speed has 4 levels. Each time you touch the screen button, the blade speed will raise a level. When the speed reaches the highest level, the touch button can't adjust any more.
10		Blade speed
11		Decrease blade speed. The blade speed has 4 levels. Each time you touch the screen button, the blade speed will reduce a level. When the speed reaches the lowest level, the touch button can't adjust any more.
12		Increase driving speed. The drive speed has 4 levels. Each time you touch the screen button, the drive speed will raise a level. When the speed reaches the highest level, the touch button can't adjust any more.
13		Driving speed
14		Decrease driving speed. The drive speed has 4 levels. Each time you touch the screen button, the drive speed will reduce a level. When the speed reaches the lowest level, the touch button can't adjust any more.
15	80%	Battery percentage. When it equals to 5% or less, stop work and charge the battery as soon as possible.
16	Energy use	Energy use state
17		ETO button. Touch to control the attachment power.
18		Low traction control button. Touch to change to low traction control mode.
19		Error warning. Touch to check the error code and content.
20	CUTTING	Cutting session. Touch to turn to the cutting session page.

4.4 Electrical Wiring Diagram



1. Battery pack
2. Drive motor-right
3. GPS module
4. Top light-right
5. Blade motor-right
6. Headlight
7. ETO socket
8. Top light-front
9. Blade motor-left
10. Blade controller fuse
11. Top light-left
12. USB charging socket
13. Service switch
14. Drive motor-left
15. Park switch-left
16. Accelerator potentiometer-left
17. Fast charging socket
18. Drive controller-slave
19. Drive controller fuse
20. Seat switch
21. Main circuit relay
22. Attachment circuit fuse
23. Attachment circuit relay
24. Drive controller-master
25. Park switch-right
26. Accelerator potentiometer-right
27. PBS power switch
28. PTO switch
29. Display
30. Blade controller

5 Deck

The deck system carries out mowing work. It consists of the blade, the blade motor and the welded body of the deck. When removing the blade and the blade motor, please hoist the front section of the machine. Please rotate service switch to OFF position before removal and installation of following deck, blades and motor parts.

5.1 Blade

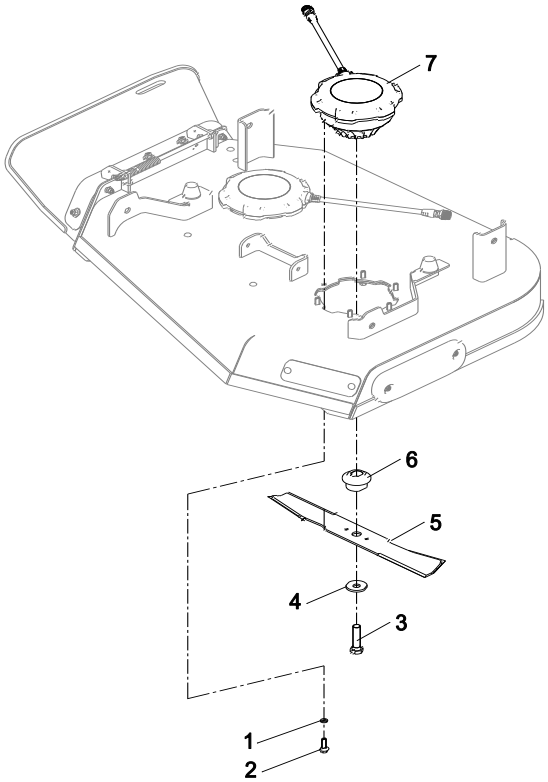


Fig. 1

1. Spring washer 10
2. Bolt hexagon flange bolt grade B M10*35
3. Bolt M16*80
4. Blade washer
5. Discharge blade (Mulching blade)
6. Blade holder
7. Blade motor

Removal:

1. Using a hoisting tool to hoist the front end of the deck to a certain angle.
2. With protective gloves on, block and secure the end of the blade (5) with wooden block, and loosen the bolt (3) with a 24 mm socket by rotating counterclockwise.
3. Remove the bolt (3), blade washer (4), blade (5) and blade holder (6) in order.

Installation:

1. Install blade washer (4), blade (5) and blade holder (6) on the bolt (3) in order, manually rotate the bolt (3) into the threaded hole of the motor center shaft.

2. With protective gloves on, snap the end of the blade (5) with a wooden block and tighten the bolt (3) with a 24 mm socket by rotating clockwise, with a fastening torque of 155-160 N•m (114~118 Ft-lbs).
3. Gently rotate the blade by hand and make sure there is no conflict between the blades and the deck housing, by doing so the blades can rotate freely and smoothly.

NOTE:

1. The removal and the installation steps for the two blades are the same.
2. Discharge blade and mulching blade installation method and procedure are the same.
3. Frequently inspect the wear of the blades. Replace in time if a blade is overworn, otherwise it will affect the dynamic balance of the working motor and lead to earlier damage of the blade motor.

5.2 Blade Motor

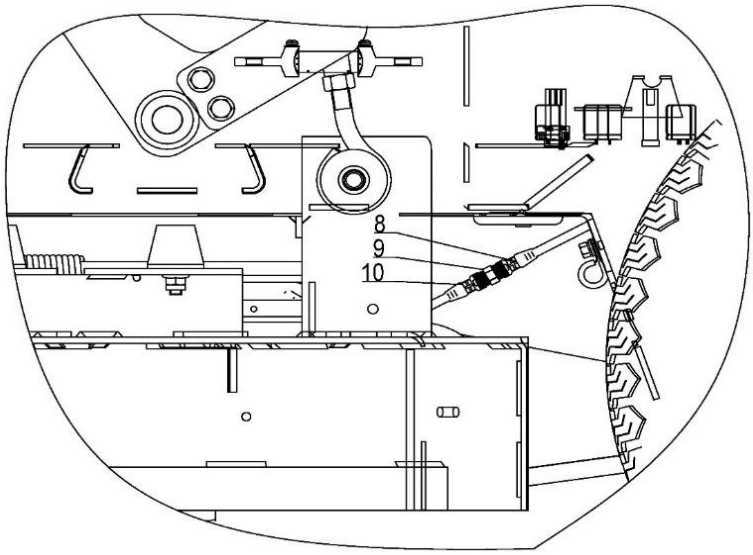


Fig. 2

8. Blade power cord tail clip
9. Fastening nut
10. Motor end tail clip

Removal:

1. Turn service switch to OFF position.
2. Rotate the fastening nut (9) counterclockwise and make sure the blade power cord tail clip (8) and motor end tail clip (10) are separated.
3. Disconnect left and right motor harness connections in sequence.
4. Refer to Fig. 1, using a hoisting tool to hoist the front end of the deck to a certain angle.
5. Remove the blade (see 4.1 for detailed steps).
6. Use a 13 mm socket wrench to loosen the bolt (2) by rotating counterclockwise.
7. Remove the bolt (2) and the spring washer (1) altogether.
8. With six sets of bolt and washer (1, 2) removed from each motor, remove the blade motor (7) from the deck.

Installation:

1. Put the blade motor (7) into the mounting hole of the deck housing. Rotate the motor until the motor mounting hole aligns with the deck mounting hole.
2. Slip the spring washer (1) onto the bolt (2) in order. Apply thread locker on the end of the thread and manually screw the bolt clockwise into the motor mounting threaded hole. Each motor is fixed by six sets of such bolts.

3. Tighten the bolt (2) clockwise with a 13 mm socket wrench to a tightening torque of 23 N•m (17 Ft-lbs). Motor installation is complete.
4. Operate motor removal steps reversely, plug the blade power cord tail clip (8) and motor end tail clip (10) against each other respectively and fasten with the fastening nut (9) as shown in Fig. 2.

NOTE:

1. The removal and installation steps for the two blade motors are the same.
2. Before removing the harness of the blade controller, rotate service switch to OFF position.
3. When installing the blade motor harness, make sure position of each motor (left, right) corresponds with the blade power cord (left, right). Do not reverse the correspondence.

5.3 Deck Height Adjustment

CAUTION:

Rotating blade is very dangerous. Before adjusting the deck height, make sure the service switch is in OFF position. When grabbing the blade or working around the blade, the operator usually needs to wear protective gloves to prevent cutting injury.

NOTE:

1. Drive the machine to a level ground and turn service switch to OFF position.
2. Check if the left and right tire pressures are appropriate and make sure they are the same.
3. The operator uses the height adjustment handle to adjust the deck to the height of transmission position.
4. Put the deck height limit pin (12) in the 3 inches (76 mm) limit hole as shown in Fig. 5 below.
5. Make sure the blades are positioned as shown in Fig. 3.
6. Use a ruler or a level meter (Fig. 4) to measure the clearance gap between the tips of two blades and the ground. The blade tip clearance should be 76 mm (±3 mm) above the ground.
7. If the clearance is off, adjust the blade tip height; if the clearance is correct, adjust the front and rear heights of the blades.

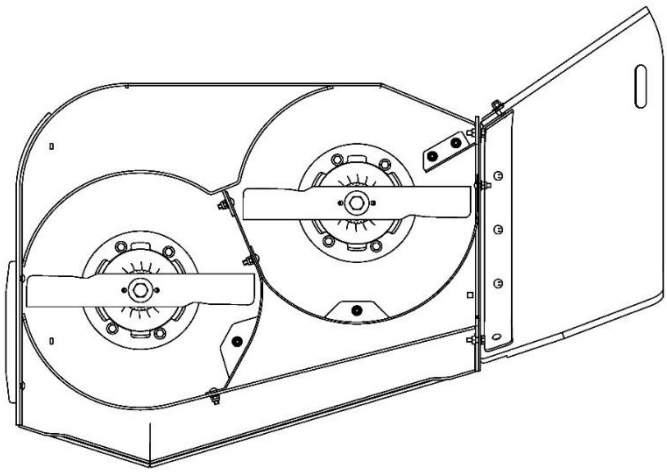


Fig. 3

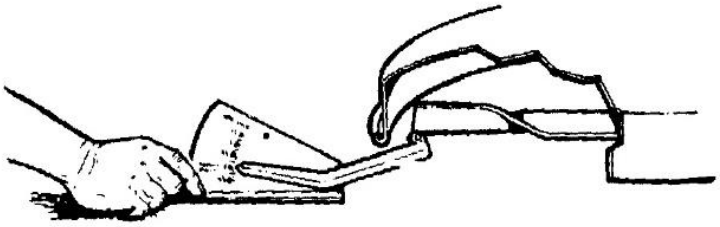
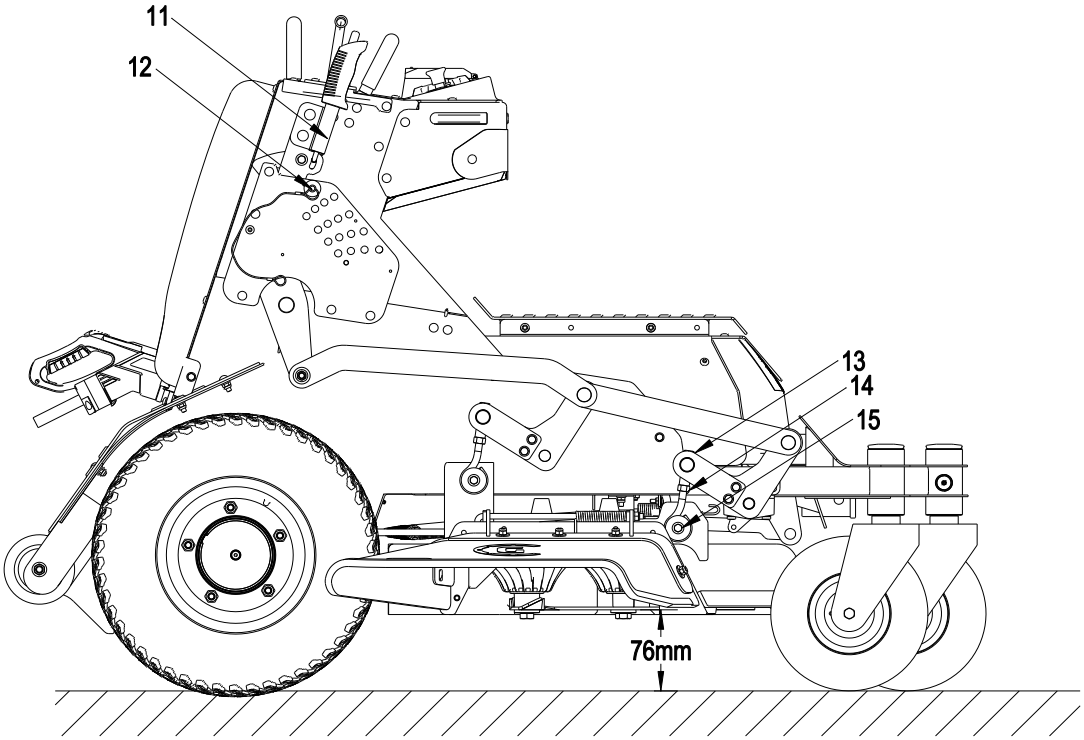


Fig. 4

5.3.1 Blade Tip Height Adjustment

1. Use an 18 mm open-end wrench to loosen the fastening nut (14) at the lower end of the height adjustment lever.
2. Rotate the adjusting screw (13) clockwise to raise and counterclockwise to lower the blade height. Adjust the blade tip clearance above the ground within the range of 76 mm (±3 mm).
3. When the blade position reaches the required height, tighten the fastening nut (14) to a tightening torque of 30-35 N•m (22~26 Ft-lbs).



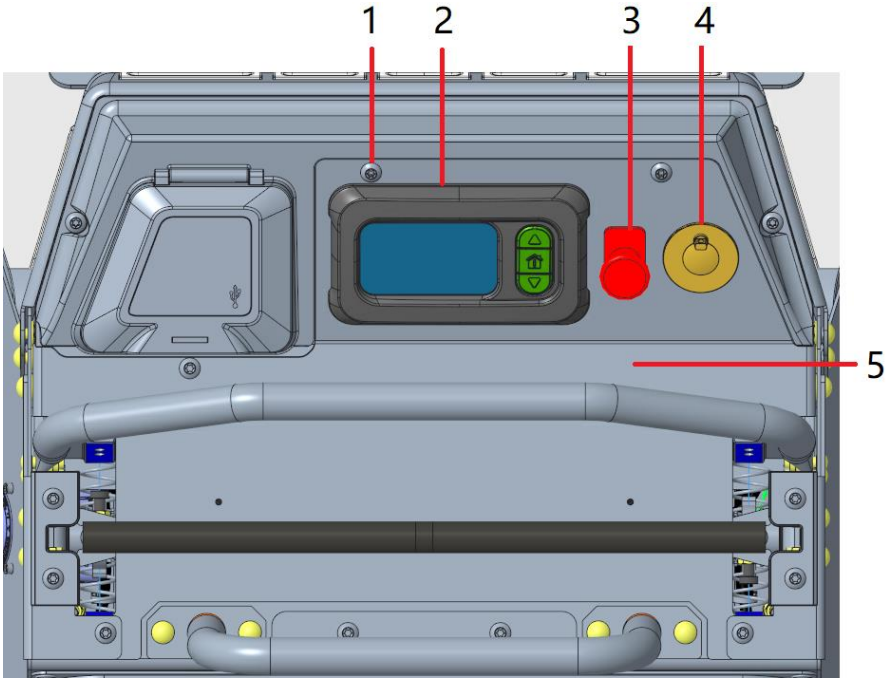
11. Height adjustment lever pedal shaft
12. Lock lever
13. Adjusting screw
14. Fastening nut
15. Tie rod

5.3.2 Blade Tilt Adjustment

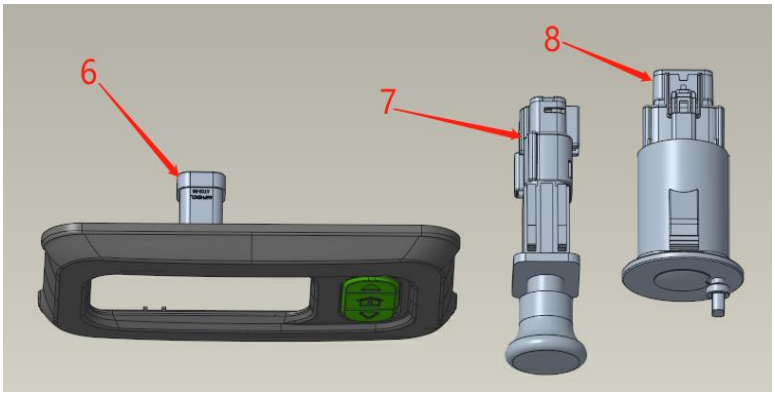
1. Put the deck height at 3 inches (76 mm).
2. Lift the discharge chute and adjust the right blade orientation to the front and rear of the vehicle.
3. Measure the clearance of the front end of the right blade to the ground.
4. Rotate the blade by 180° and measure the rear end of blade tip clearance to the ground.
5. Rotate the adjusting screw to make sure that the height of the blade tip at rear is higher than that of at front, with a 3-6 mm height gap.
6. Repeat the steps above to adjust the height of left blade.

6 Operation

6.1 Meter and Switch



1. Bolt M6*20
2. Meter
3. PTO switch
4. Ignition switch
5. Panel



6. Meter connector
7. PTO connector
8. Ignition switch connector

Removal：

1. Use T30 head tool to remove M6*20 bolts (1) on the panel (5) according to the above figures, lift the panel (5) slowly, manually remove the meter (2), ignition switch (4) and PTO switch (3) from the panel (5).

NOTE:

1. Disconnect the corresponding connectors (6, 7, 8) when removing meter (2), PTO switch (3) and ignition switch (4).
2. The meter connector (6) is printed ‘Display’, the PTO connector (7) is printed ‘PTO’, the ignition switch (8) is printed ‘Switch’.

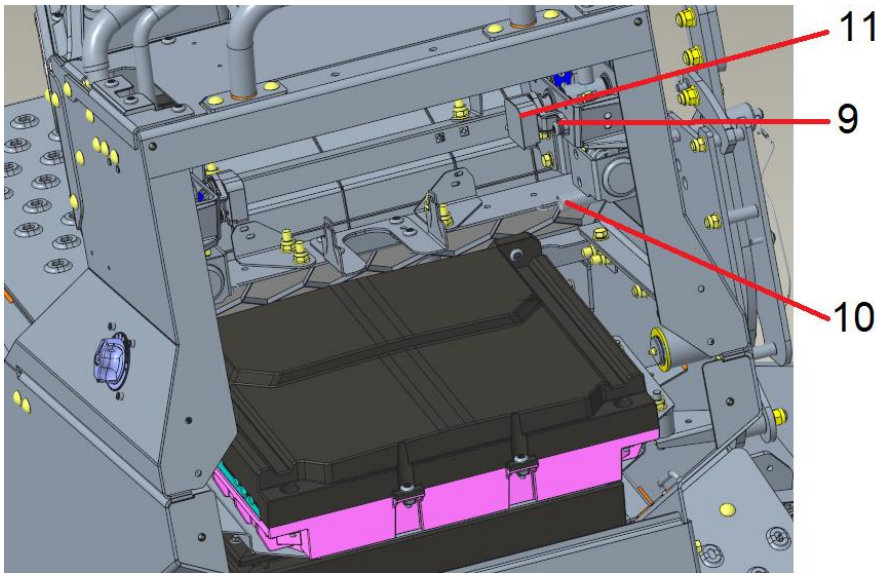
Installation:

After the above operations of removal, find the meter connector (6), PTO connector (7) and ignition switch connector (8), the connectors are printed ‘Display’, ‘PTO’ and ‘Switch’, press the connectors into the panel (5) after the connectors are connected.

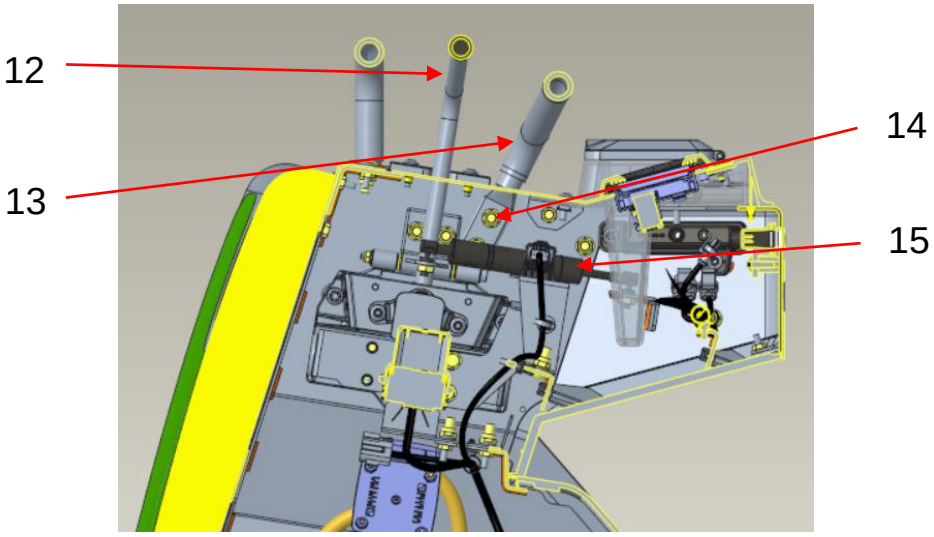
NOTE:

Please pay attention to the direction of the ignition switch (4) (the key is on the right side).

6.2 Replace the Handling Damper



9. Potentiometer connector
10. Extension spring
11. Potentiometer



12. Steering control lever
13. Hand stabilizer bar
14. Nut M8
15. Handling Damper

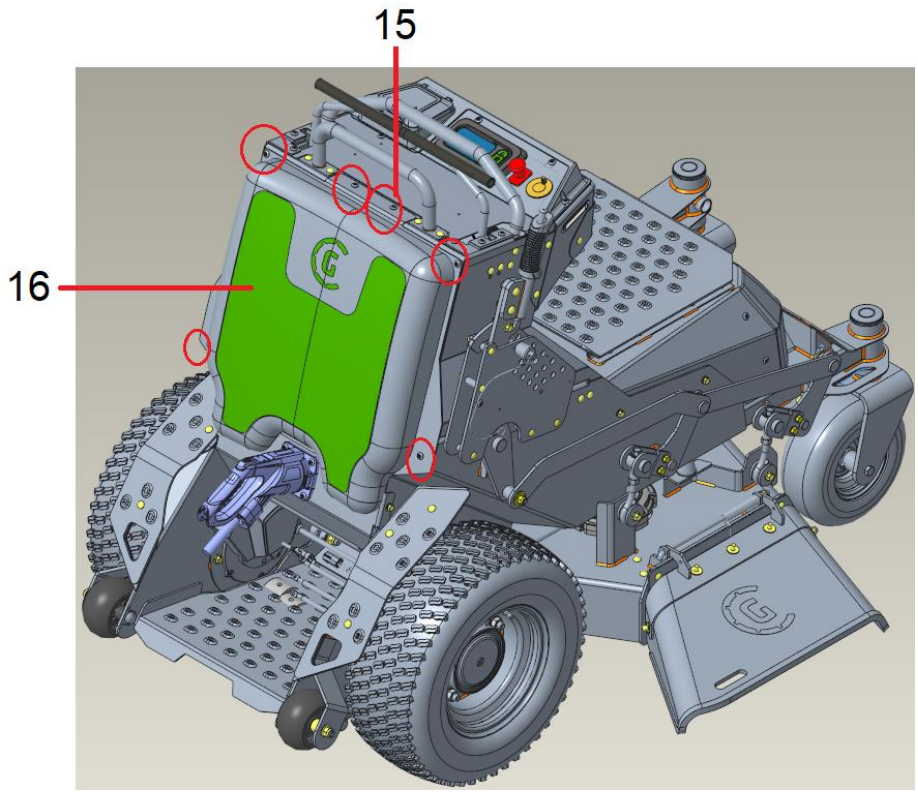
Removal

After completing the removal work in 6.1, use a 13mm open-end wrench to remove four M8 nuts (14) that fix the hand stabilizer bar (13), remove the hand stabilizer bar (13) and handling damper (15), and then unplug the connector (9) of the potentiometer (11). Remove the tension spring (10) from the frame, the steering control lever (12) can be removed.

Installation:

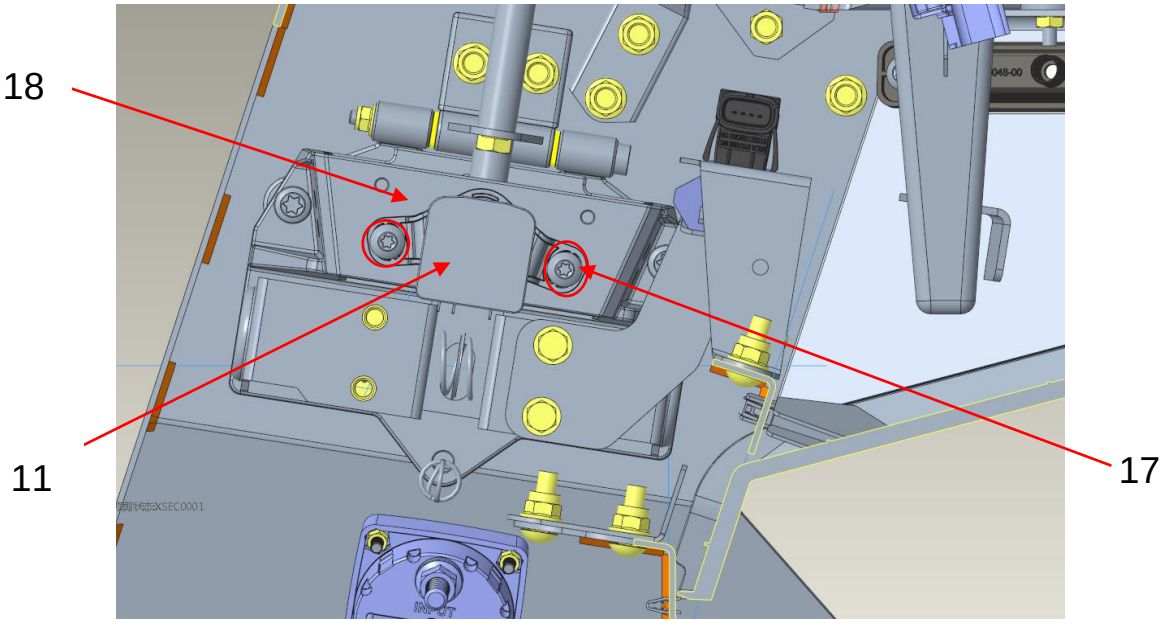
Operate in reverse to install the steering control lever (12) according to the removal steps.

6.3 Adjustment of the Control Handle Centre Position



15. Screw M16*20 16. Cushion set

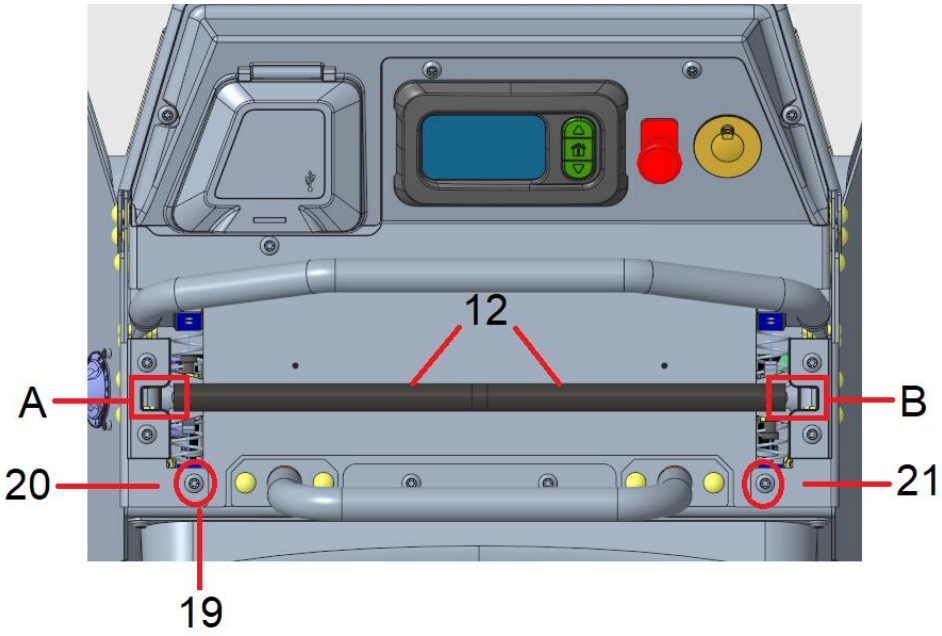
1. Remove six M6*20 screws (15) with a T30 head tool, and remove the cushion set (16).



11. Potentiometer 18. Aluminum seat

17. M6*20 combined screw

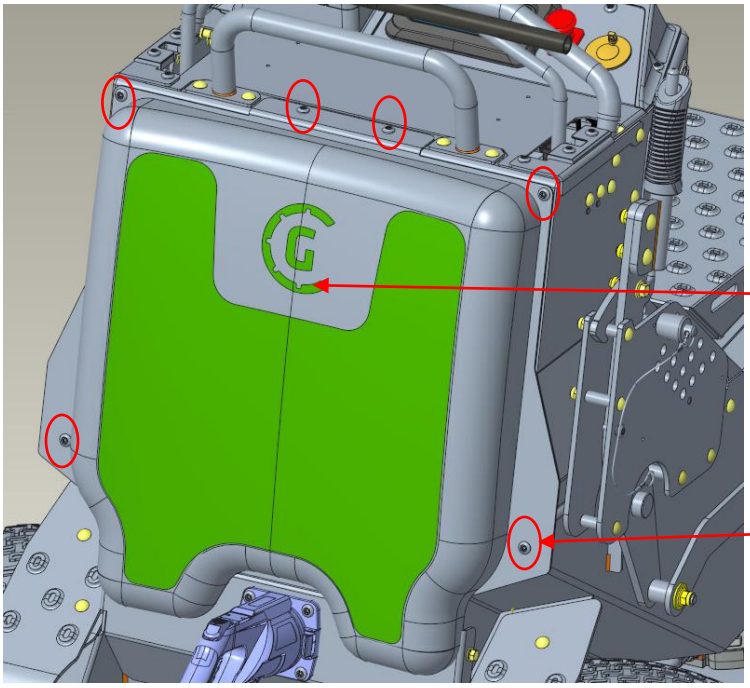
2. Reach in with your hand from the cushion combination and use T30 head to loosen the two M6×20 combination screws (17) (loosening is sufficient), make sure that the potentiometer (11) is mounted on the aluminum seat (18) in a free return to the center state (there is no external force in the circumferential direction), and then tighten the two M6×20 combination screws that you just loosened (left and right symmetry, the same operation).



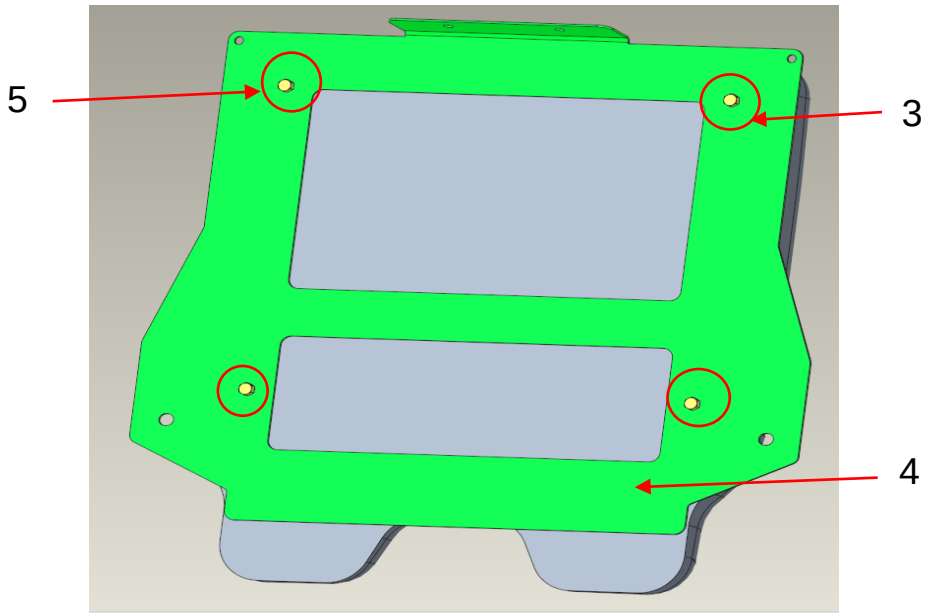
12. Steering control lever
19. Bolt M6*20
20. Left cover
21. Right cover

3. Finally, loosen M6*20 bolts (19) with a T30 tool, and the left cover (20) and right cover (21) can be easily adjusted. Adjust the lever front to back and side to side, and then ensure that the opened lever (12) can be located just inside groove A and groove B.

7 Cushion Pad



1. M8*20 bolt assembly
2. Cushion set



3. Cushion
4. Mounting plate
5. M8*20 combined screw

Removal:

1. Use a 13 mm socket to loosen the upper and lower six M8*20 bolts (1), and remove the cushion set (2);

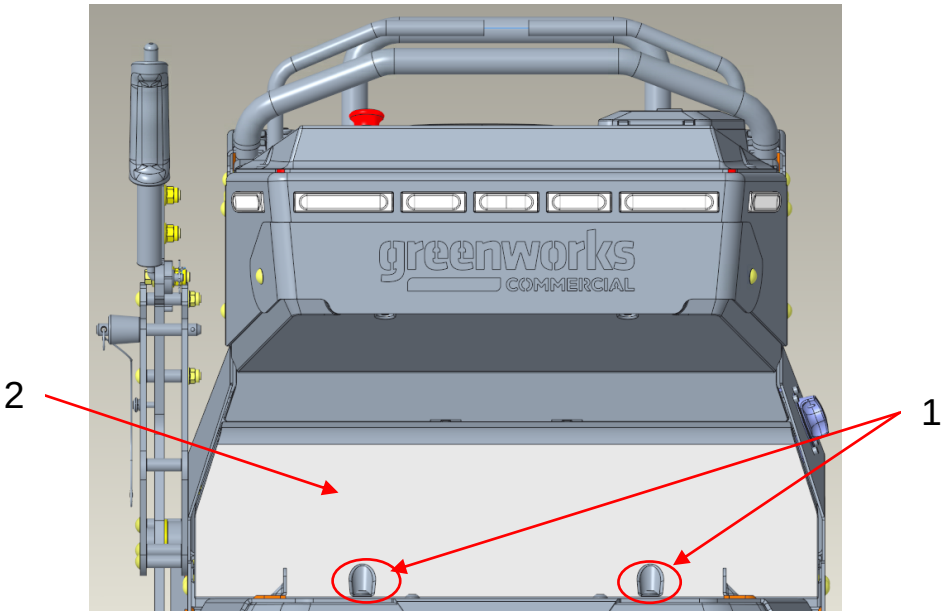
2. Use a 13 mm socket to remove four M8*20 combined screws (5). Remove the upper mounting plate (4) and cushion (3) respectively.

Installation:

1. Align the holes of the upper mounting plate and the lower mounting plate with the holes of the cushion, use a 13 mm sleeve to install four M8*20 combined screws (5), and tighten the screws;
2. Tighten the installed cushion set in the frame with four M8*20 bolts (1), and install the cushion set (2).

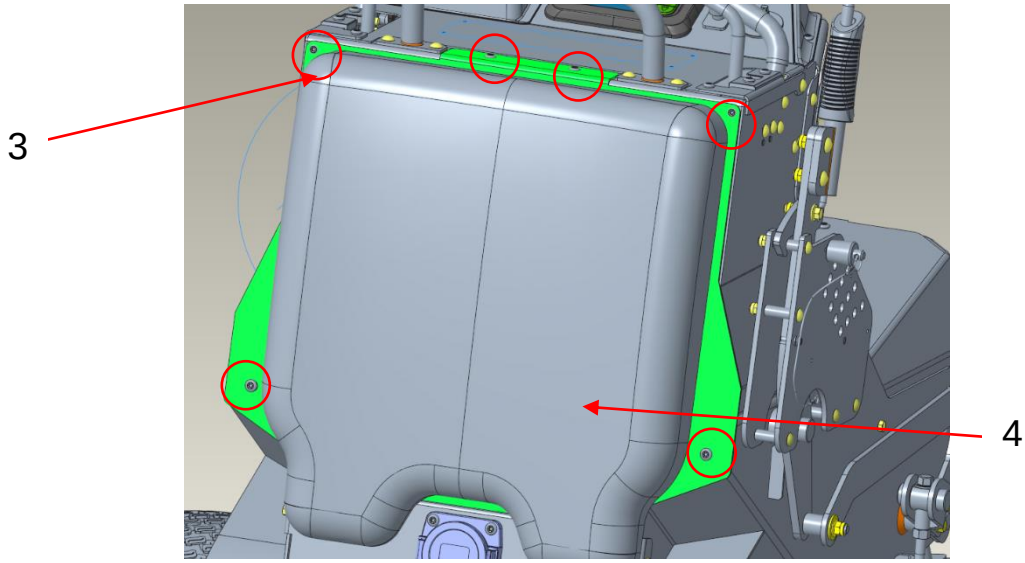
8 Blade and Drive Controller Panel

8.1 Remove Electric Components from Controller Panel



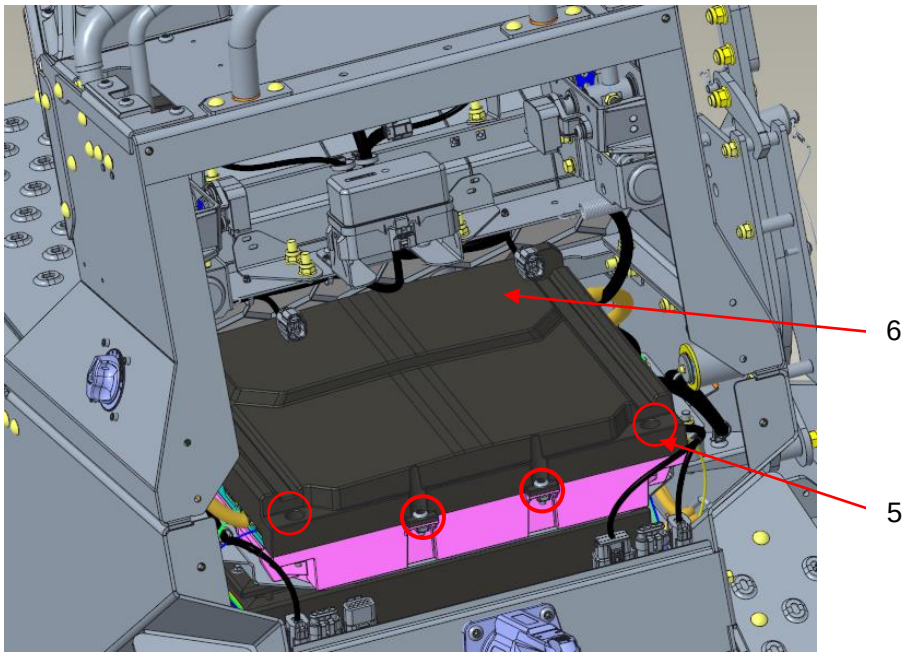
1. M6*20 Bolt 2. Cover piece

1. Remove two M6*20 bolts (1) with a T30 tool, remove the cover piece (2) by pushing to the outside.



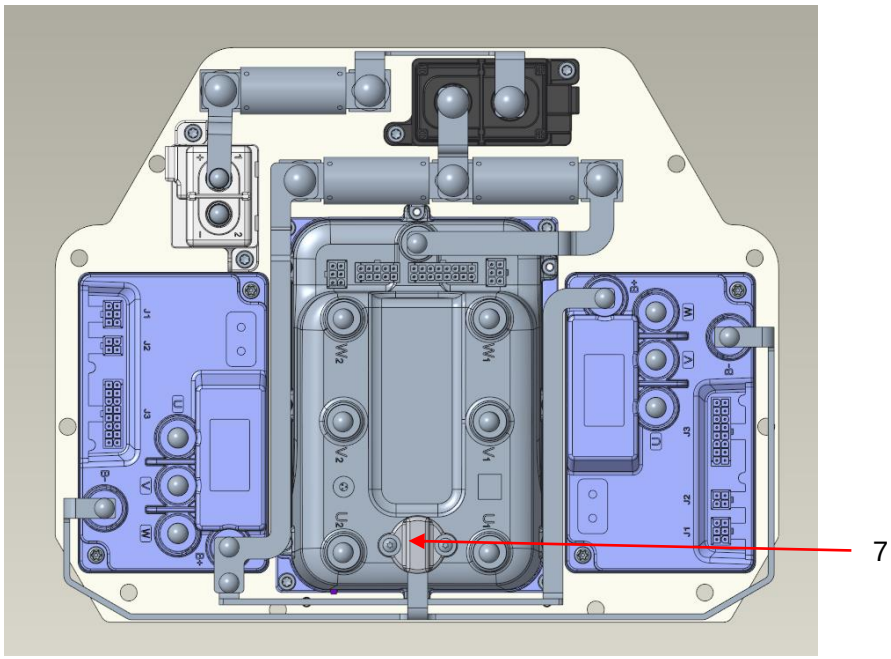
3. M8*20 Bolt assembly 4. Cushion set

2. Use a 13mm socket to loosen six M8*20 bolt assembly (3), remove the cushion set (4).



5. M6*20 screw assembly 6. Controller upper housing

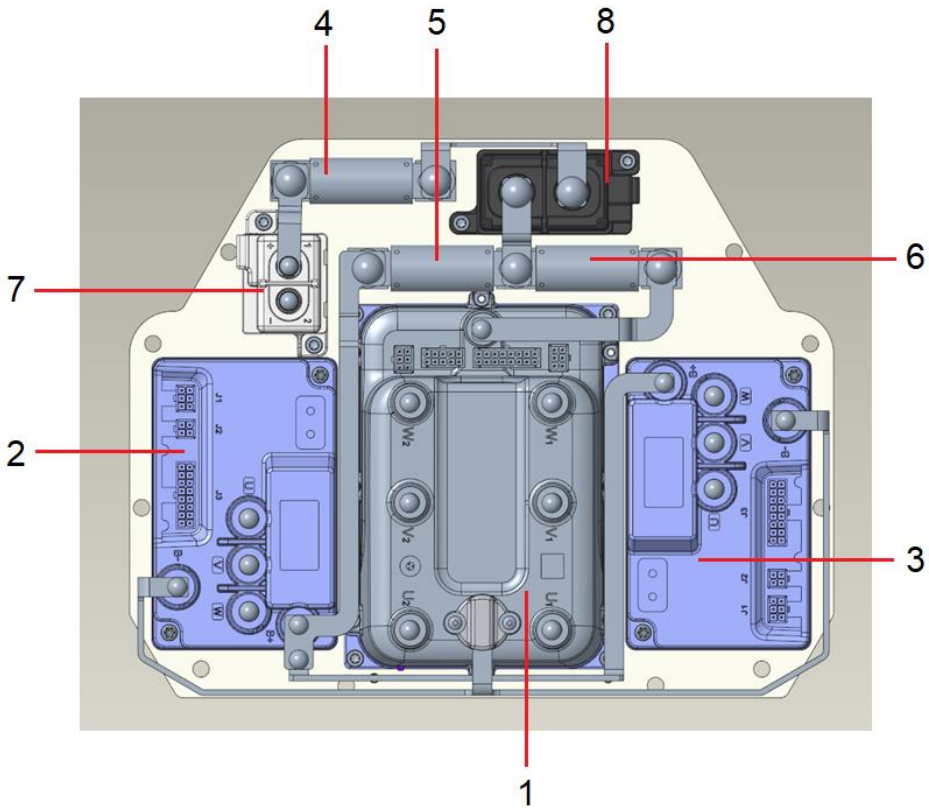
3. Loosen the knob bolt (5), remove the water flap (6).



7. Controller panel

4. Then you will see the controller panel (7).

8.2 Blade Controller and Drive Controllers



1. Blade controller
2. Drive controller-slave
3. Drive controller-master
4. Attachment circuit fuse, 100A
5. Drive controller fuse, 100A
6. Blade controller fuse, 100A
7. ETO relay, 120 A
8. Main relay, 200 A

NOTE:

Before the removal and installation, unplugging harness on the controller parts as well as the replacement of components, make sure the vehicle battery pack connection to power source is disconnected to prevent electrical shock hazard.

Removal and Installation of Blade Controller:

1. Use an 8 mm socket wrench to remove the bolts fixing the U, V and W three-phase wires of the blade motor mounted on the blade controller (1).
2. Separate the blade motor three-phase wires from the motor controller. There are two such three-phase wires corresponding with the two blade motors respectively. When installing the blade motor three-phase wires, note that each location must be installed on the corresponding blade controller and that U, V and W three-phase wires must completely correspond with the U, V and W marks on the corresponding blade controller. They should not be connected reversely or incorrectly.

3. Remove copper bar connected from B+/B- to blade controller (1).
4. Disconnect the signal connector and loosen the bolts that mounting the controller to the aluminium plate.
5. Remove the blade controller (1).

NOTE:

Before the drive controller is installed onto the aluminium plate, it is applied with a layer of thermal grease at the bottom. After replacement or repair, during the installation, the thermal grease needs to be reapplied.

1. Thermal grease type LOCTITE TG 100 or type GD900-SY7 (ERP: R0211808-00).
2. Usually, one controller needs one small tube (ERP: R0211808-00) thermal grease.

Removal and Installation of Drive Controller:

1. Use a 10 mm socket wrench to remove the bolts fixing the U, V and W three-phase wires of the drive controllers (2, 3).
2. Separate the drive motor three-phase wires from the drive controller. Two in total, corresponding with left and right drive motors respectively. Installation of drive motor three-phase wires has designated directions. Drive motor on the left side must be installed on the left drive controller and the U, V and W three-phase wires must completely correspond with the U, V and W marks on the corresponding drive controller.
3. Remove copper bar connected from B+/B- to drive controllers (2, 3).
4. Disconnect the signal connector and loosen the bolts that mounting the controller to the aluminium plate.
5. Remove the drive controller (2, 3).

NOTE:

Before the drive controller is installed onto the aluminium plate, it is applied with a layer of thermal grease at the bottom. After replacement or repair, during the installation, the thermal grease needs to be reapplied.

1. Thermal grease type LOCTITE TG 100 or type GD900-SY7 (ERP: R0211808-00).
2. Usually, one controller needs one small tube (ERP: R0211808-00) thermal grease.

8.3 Relay

Removal:

1. Remove the copper bar on the relays (7, 8). Use 7 mm socket wrench for the relay (7) and 13 mm socket for the relay (8). Pull out plugs on the relays (7, 8).
2. Use a T25 hexagon wrench to remove the bolt mounting the replays (7, 8) onto the aluminium plate.

8.4 Fuse

1. Use a 13 mm socket wrench to remove the copper bar on the fuses (4, 5, 6).
2. Fuses (4, 5, 6) can be removed altogether for replacement.

8.5 U/V/W Three-phase Wire

1. To connect the blade controller motors, refer to the number markings for the U/V/W three-phase cables. See Fig. 5 for details.
2. As shown in the image, position the sockets so that B+ is facing upwards and B- is facing downwards.
3. Connect the U/V/W three-phase cables for the left, centre and right blade controllers to the left, centre, and right U/V/W sockets respectively.

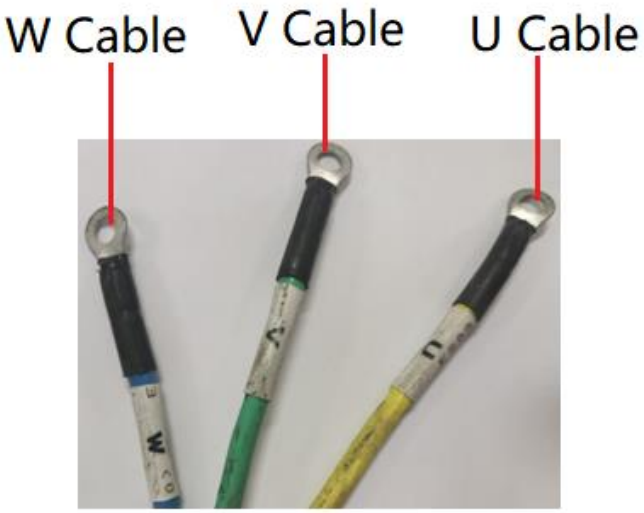


Fig. 5

9 Wheels and Drive Motor

9.1 Front and Rear Wheel

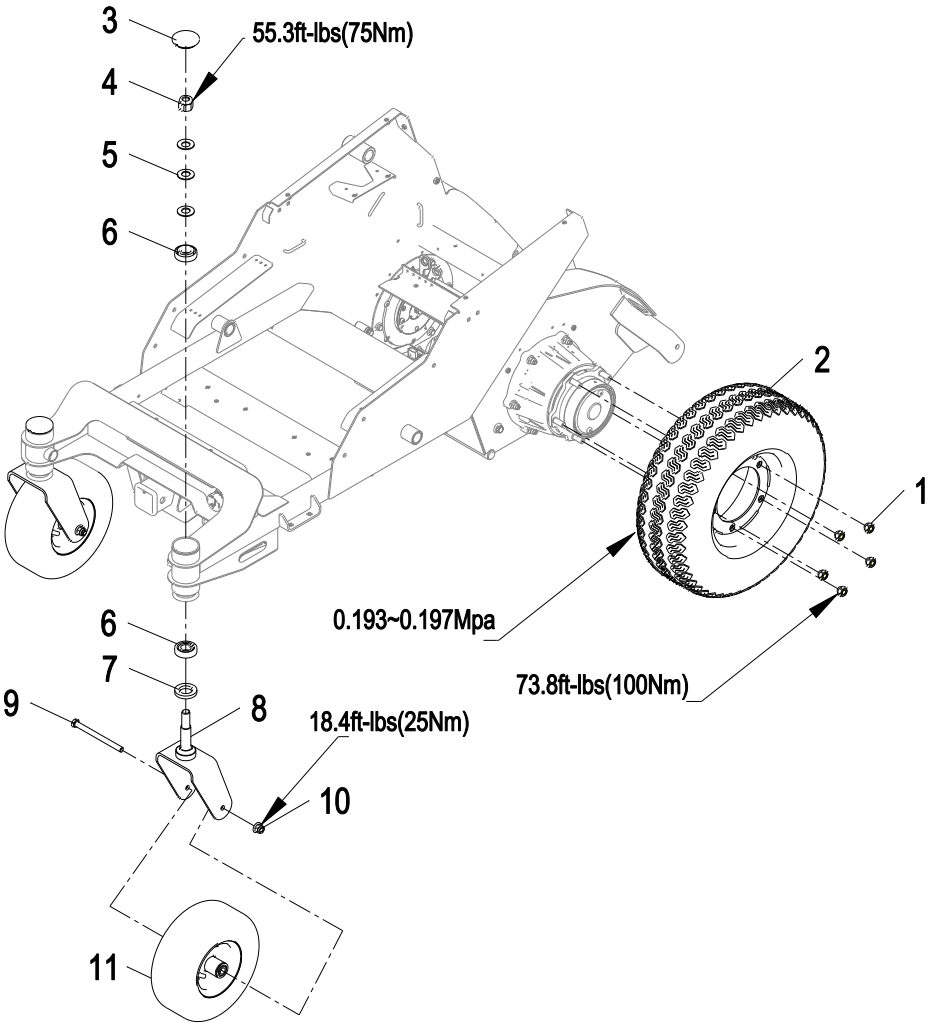


Fig. 1

1. Fastening bolt
2. Rear wheel
3. Dust cap
4. Nut M20
5. Disc spring
6. Bearing
7. Oil seal
8. Front fork weldment
9. Bolt, Hex M12*160
10. Nut M12
11. Front wheel

Removal of Front Wheel:

1. Using a hoisting tool, hoist the front end of the chassis to a certain angle.
2. Loosen and remove the bolt (9) and nut (10) with two 18 mm socket or wrench.
3. Remove the front wheel assembly (11).

Removal of Front Fork:

1. Pry open the dust cap (3) with a screwdriver.
2. Loosen the nut (4) with a 30 mm socket wrench by rotating counterclockwise and remove the nut (4), disc springs (5), and the inner ring of the upper side bearing (6).
3. Remove the front fork (8), oil seal (7) and the inner ring of the lower side bearing (6) altogether.

Removal of Rear Wheel:

1. Using a hoisting tool, hoist the rear end of the machine to let the rear wheels off the ground.
2. Remove the five fastening bolts (1) of the rear wheels with a 21 mm socket wrench.
3. Remove the rear wheels (2).

NOTE:

Tightening torques for the bolts: fastening bolt (1) is 100 N•m (73.8 Ft-lbs); the bolt (4) is 75 N•m (55.3 Ft-lbs), and the bolt (9) is 25N•m (18.4 Ft-lbs).

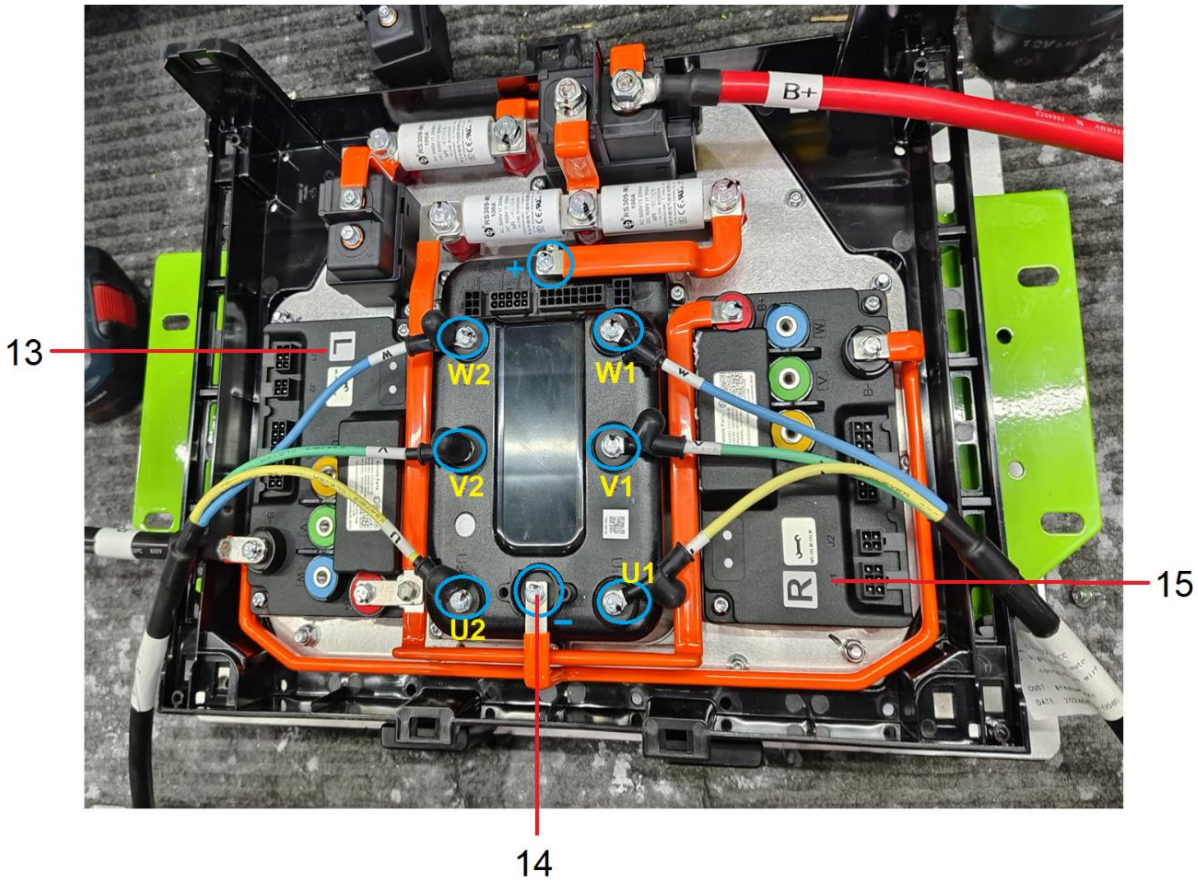
9.2 Drive Motor

IMPORTANT:

Before removing the drive motor, disconnect the battery pack power supply and remove the rear wheels.

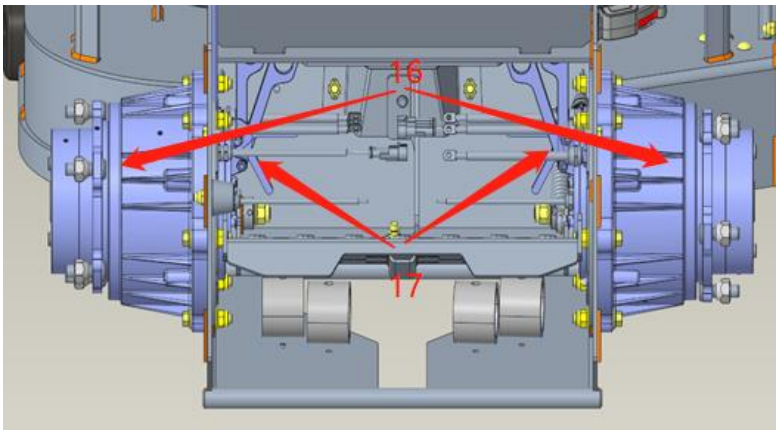
Removal:

1. Remove the two rear wheels (left and right), see 8.1 for detailed steps.
2. Remove the cushion, see 6 for detailed steps.



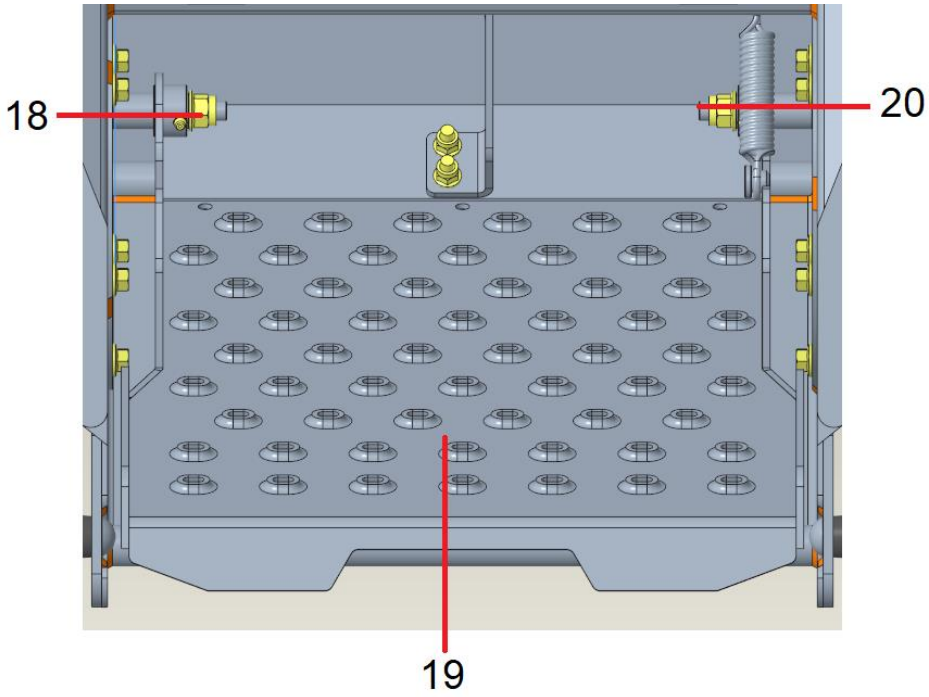
13. Left drive motor controller
14. M5*12 combined screw
15. Right drive motor controller

3. Use 8 mm hexagon wrench to remove the six M5*12 combined screws (14), remove the U, V and W three-phase wires of left motor and right motor from the left motor controller (13) and right motor controller (15).



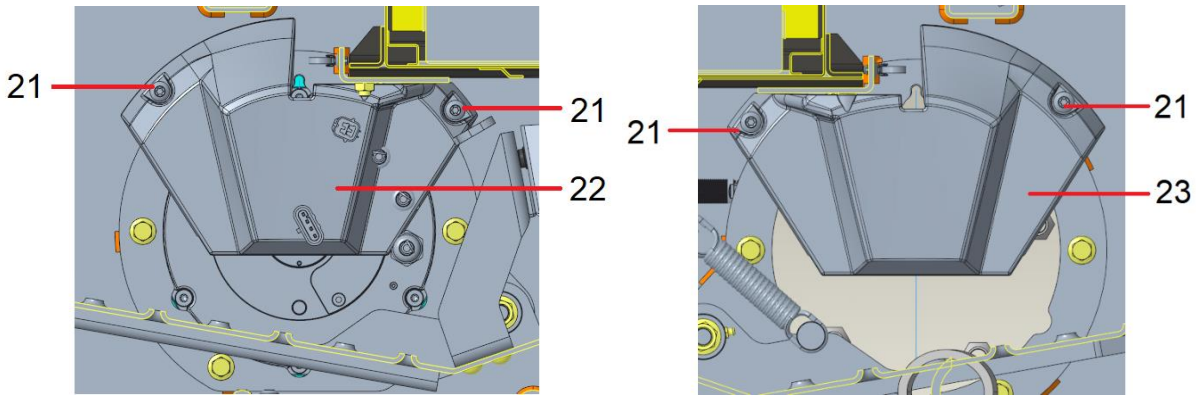
16. Drive motor
17. Backing board

4. Use hexagonal wrench to remove two M6*20 bolts on the both sides of the drive motor (16), remove the two backing boards (17).



18. M12 Locking nut
19. Platform
20. M12*70 Bolt

5. Use 15 mm socket wrench and 18 mm open end wrench to remove two M12 locking nuts (18) and two M12*70 bolts (20), then remove the platform (19).

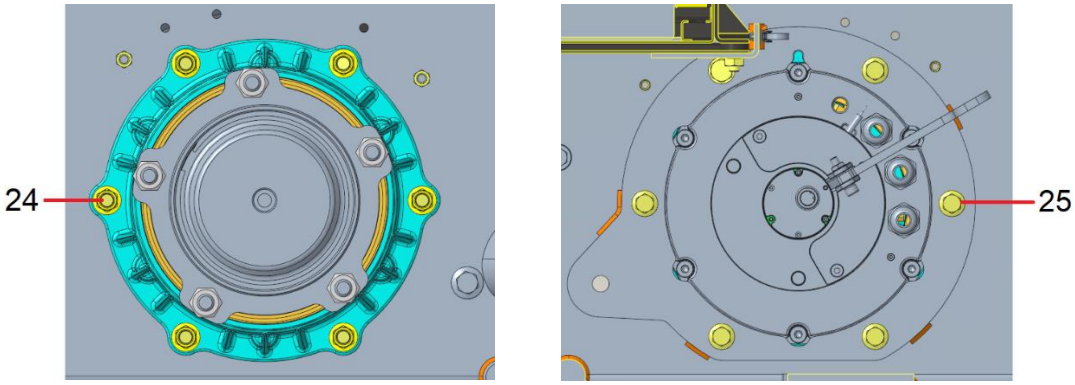


21. M6*20 Bolt

23. Right protecting cover

22. Left protecting cover

6. Use T30 tool to remove the four M6*20 bolts (21), remove left and right protecting cover (21, 23) on both sides.



24. M10*40 Bolt

25. M10 Locking nut

7. Use 13 mm socket wrench and 15 mm open end wrench to remove the twelve sets of M10*40 bolts (24) and M10 locking nuts (25) on both sides, lift the drive motor, slowly pull out the three-phase wire of the motor.

Installation:

Refer to the removal method for the installation method.

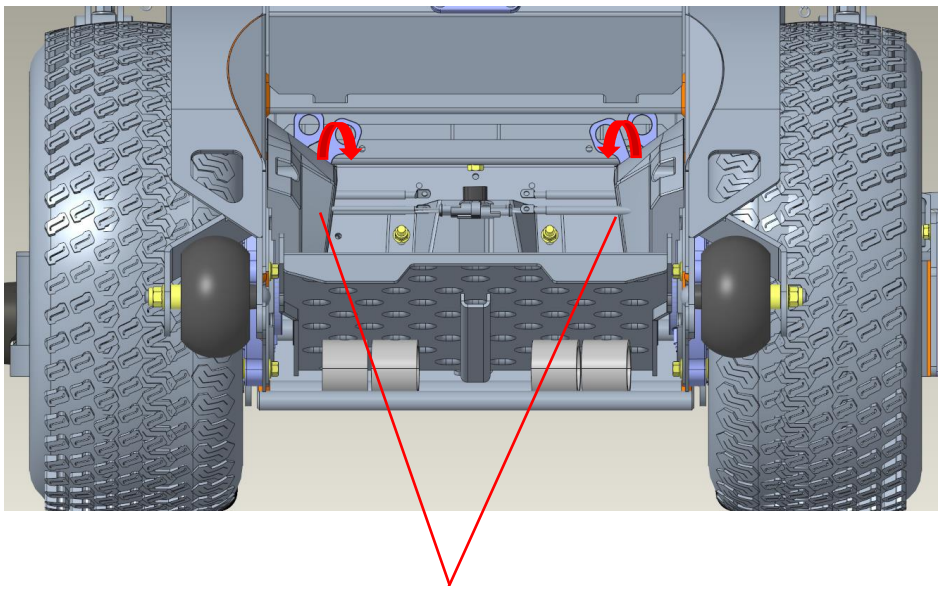
NOTE:

1. Before the drive motor is installed on the frame, it is necessary to rotate the positioning pin of the motor to the correct angle and insert the pin, then the drive motor can be installed.

2. The two drive motors have the same installation steps.

3. The three-phase (U, V, W) wire of the left drive motor is installed on the left drive motor controller, and the three-phase wire (U, V, W) of the right drive motor is installed on the right drive motor controller.

9.3 Electromagnetic Brake Release



26. Brake pull rod

Release:

When the brake pull rod (26) is pulled inward, as shown in the figure above, the electromagnetic brake is released.

Parking:

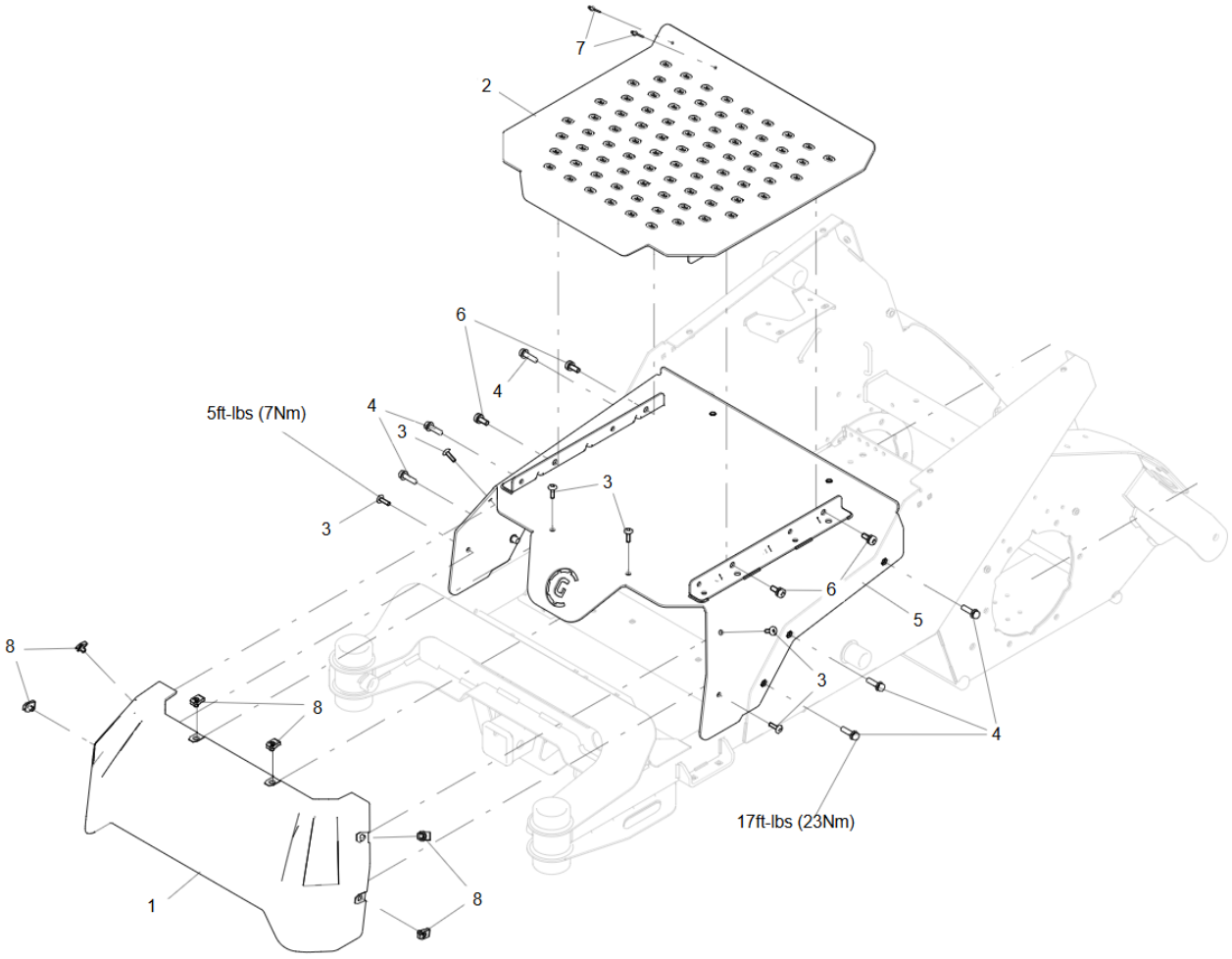
When the machine needs to be parked, push the brake pull rod (26) back outwards.

NOTICE:

In release state, the machine can be pushed normally. In parking state, the machine cannot be pushed.

10 Battery Pack

As vehicle power output device, battery pack provides the vehicle with electrical power. The battery pack is in front part of this vehicle. Removal and installation of the battery pack requires to disassemble all the covers.



1. Battery front cover	5. Guard
2. Cargo weldment	6. Screw with collar, T45 M8*20
3. Pan head screw, M6*20	7. Rivet, Φ4*8
4. Bolt, hex with washers, M8*30	8. Nut, clip-on M6

Removal:

1. Use a screwdriver to Remove two rivets (7) and four T45 screws (6), then remove cargo weldment (2).
2. Use 14mm spanner to remove six M8 bolts (4) and use 10mm spanner to remove six sets of M6 screws (3) and nuts (8), then remove battery front cover (1) and upper guard (5).

3. Remove related harness, disconnect all the connectors of the battery.

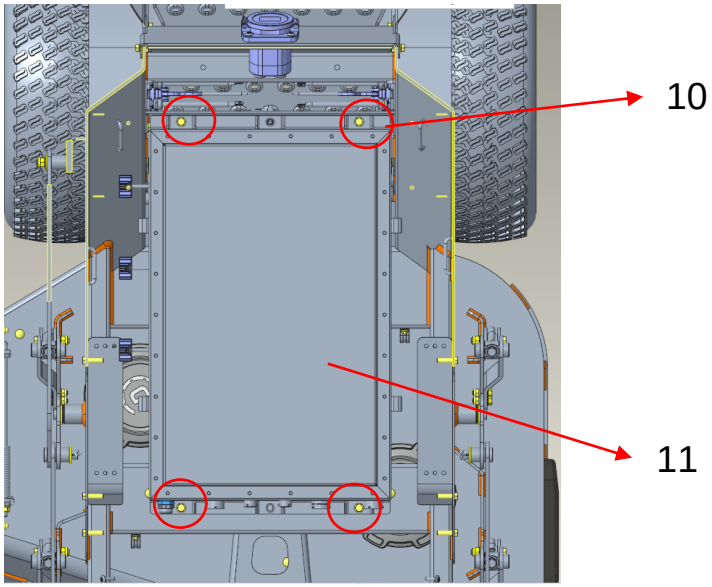
NOTE:

Before removing the battery, it is necessary to remove the high-voltage wiring harness that connected to the battery. Please rotate service switch to OFF position and ensure that the vehicle is in power-off state when removing the high-voltage wiring harness.

The following high-voltage wire connectors need to be removed:

1. Vehicle battery discharging positive wire connector
2. Vehicle battery charging positive wire connector
3. Vehicle battery charging negative wire connector
4. Vehicle battery discharging negative wire connector
5. Vehicle low-voltage control harness battery pack connector

There is no sequence for removing the high-voltage wiring harness above. When the 5 high-voltage and low-voltage wiring harness above is removed, the battery pack can be removed.



10. M8*30 Combined bolt 11. Battery pack

4. Use 13 mm socket wrench to remove the four M8*30 combined bolts (10) of the battery pack (11), lift out the battery pack (11) slowly with wire rope.

Installation:

1. Use a professional hoist to lift the battery pack and place the battery pack on the vehicle;
2. Use a 13 mm extension sleeve to install the four fixing bolts at the four corners of the battery pack;
3. Fasten the 10 fixing bolts at the four corners of the battery pack with a tightening torque of 23N•m (17Ft-lbs);
4. Connect the data cable connector of the battery pack;
5. Connect the fast charge wiring harness of the battery pack and connect the vehicle main harness;
6. Install the cover, and the battery pack is installed.

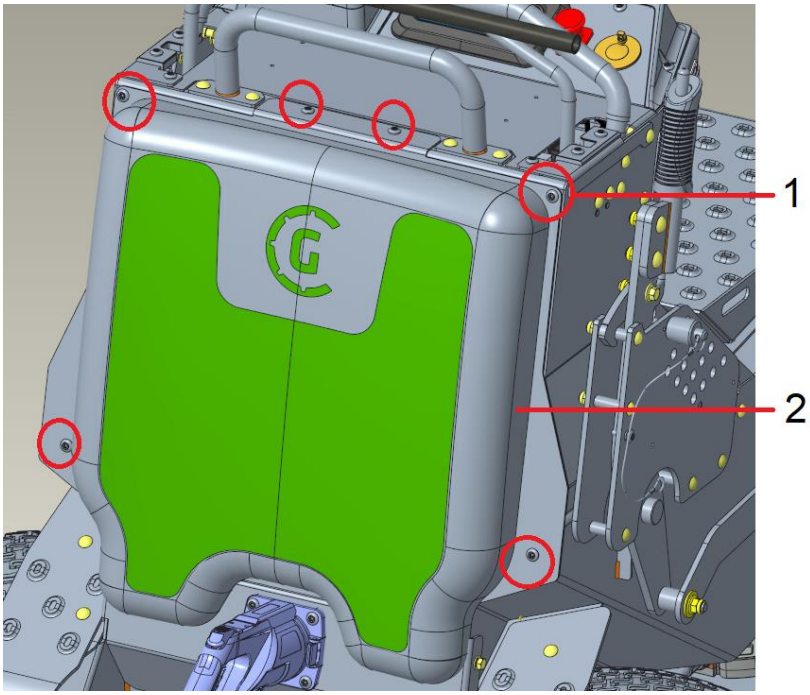
NOTE:

1. Non-professional or untrained personnel is not permitted to disassemble the battery pack;
2. Professional safety lifting tools must be used to remove the battery pack.

11 GPS

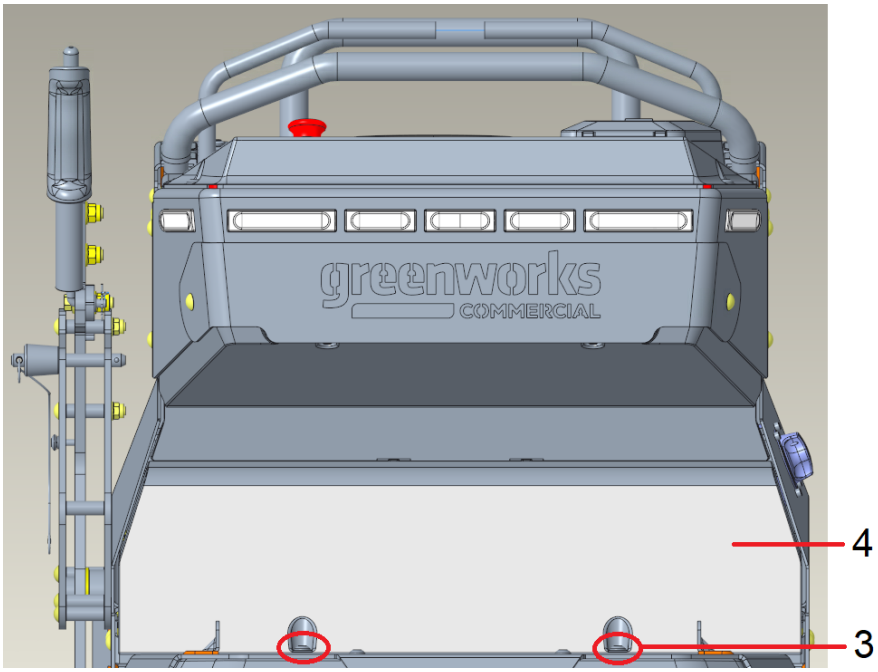
Removal:

1. Use 13 mm hex socket to remove six -M8*20 bolts (1), remove the cushion set (2).



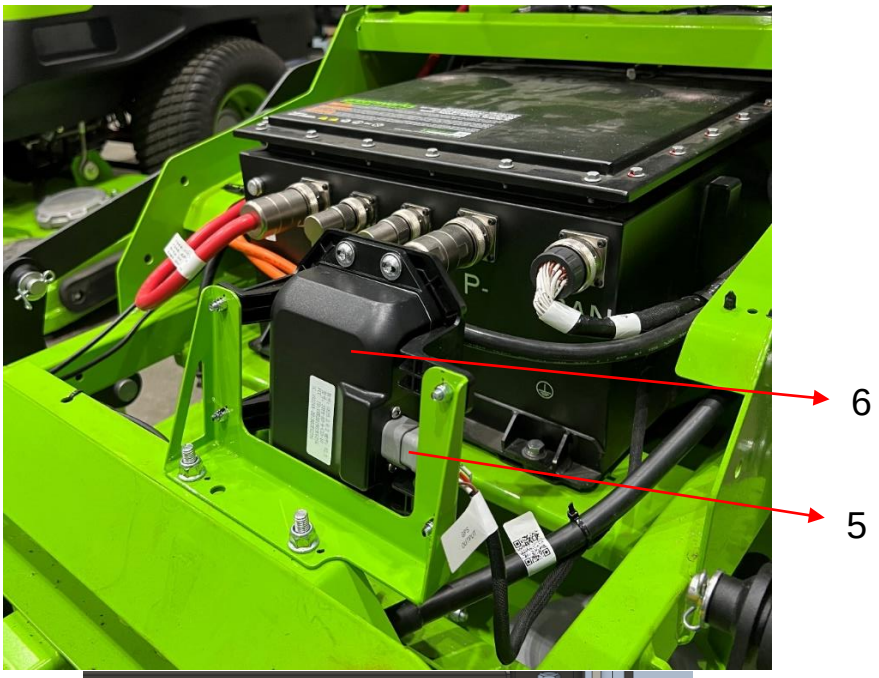
1. Pan head screws, M6 2. Cushion set

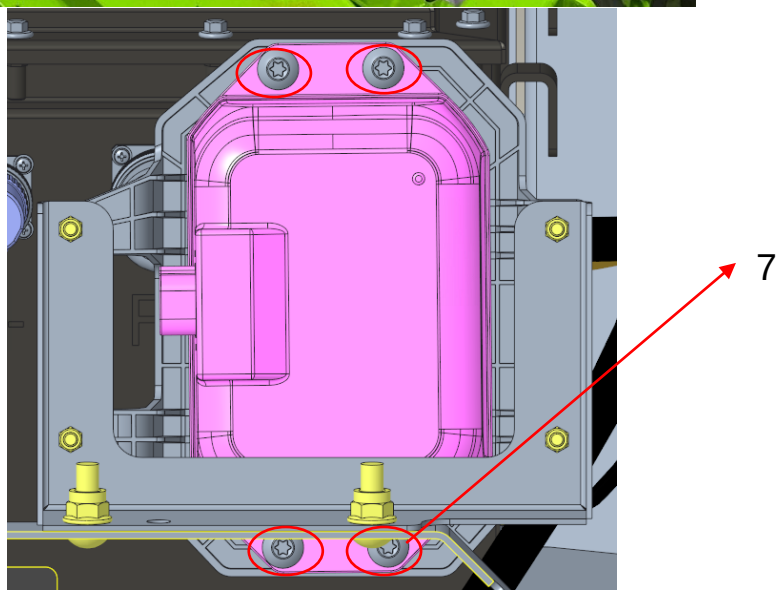
2. Loosen two screws (3), remove the water flap (4).



3. Pan head screws, M6 4. Water flap

3. The GPS (6) is installed on the bracket, use T30 tool to remove the 4 fixing screws (7), Pull out the GPS connector (5), remove the GPS (6).





5. GPS connector

6. GPS

7. Screw

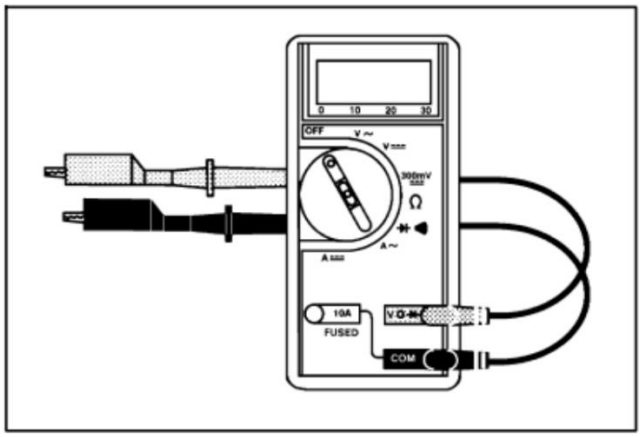
Installation:

1. Use T30 tool to install the GPS (6) on the bracket, tighten the four screws (7).
2. Connect the GPS (6) to the GPS connector (5).
3. Install the cushion set (2).
4. Install the water flap (4).

12 Special Tools

Order special tools from your Distributor. Some tools may also be available from a local supplier.

12.1 Multimeter



The multimeter can test electrical components and circuits for current, resistance or voltage.

NOTE:

Greenworks recommends the use of a DIGITAL Volt-Ohm-Amp multimeter when testing electrical circuits. The high impedance (internal resistance) of a digital meter in the voltage mode will make sure that excess current is not allowed through the meter. This excess current can cause damage to circuits not designed to carry it.
Prevent Connector Pin Damage by Fluke Test Lead. Remove pin retainer Put test lead on pin and measure. Or use 1mm needle test probe.

Tools	Photo
Fluke Test Lead	
1mm needle test probe	

12.2 Special Tools

Tools	Cable to Flash Program	Host Computer Program	Remarks
16-Pin Adaptor		N/A	ERP: R0203075-00
CAN Interface		According to the purpose of each model	ERP: R0203845-00 Download from PEAKCAN website
Debugging Harness		N/A	ERP: R0206840-00
Thermal Grease (Type, GD900-SY7)		N/A	ERP: R0211808-00 Note: Please make sure thermal grease is still within shelf life – 2 years from packing.

13 Specifications (Torque Specs)

Torque Specification Chart (General Standard Parts)							
Diameter of Thread (mm)	Pitch value of Thread (mm)	Tighten Torque Spec (Mechanical Property of Grade 8.8 for Fasteners components)					
		Standard Value		Max Value		Min Value	
		N•m	Ft-lbs	N•m	Ft-lbs	N•m	Ft-lbs
6	1	9.0	6.6	12.0	8.9	6.0	4.4
8	1.25	23.0	17.0	26.0	19.2	16.0	11.8
8	1	25.0	18.5	28.0	20.7	17.0	12.5
10	1.5	59.0	43.5	75.0	55.4	37.0	27.3
10	1.25	63.0	46.5	79.0	58.3	45.0	33.2
10	1	64.0	47.2	80.0	59.0	46.0	33.9
12	1.75	95.0	70.1	111.0	81.9	73.0	53.9
12	1.5	97.0	71.6	113.0	83.4	75.0	55.4
12	1.25	99.0	73.1	115.0	84.9	78.0	57.6
14	2	160.0	118.1	185.0	136.5	122.0	90.0
14	1.5	180.0	132.8	205.0	151.3	146.0	107.7
16	2	215.0	158.7	245.0	180.8	182.0	134.3
16	1.5	240.0	177.1	270.0	199.3	199.0	146.9
18	2.5	268.0	197.8	298.0	219.9	229.0	169.0
18	1.5	316.0	233.2	346.0	255.4	287.0	211.8
20	2.5	430.0	317.3	470.0	346.9	389.0	287.1
20	1.5	440.0	324.7	480.0	354.2	396.0	292.3

Torque Specification Chart (General Standard Parts)							
Diameter of Thread (mm)	Pitch value of Thread (mm)	Tighten Torque Spec (Mechanical Property of Grade 10.9 for Fasteners components)					
		Standard Value		Max Value		Min Value	
		N•m	Ft-lbs	N•m	Ft-lbs	N•m	Ft-lbs
10	1.5	74.0	54.6	90.0	66.4	52.0	38.4
10	1.25	78.0	57.6	93.0	68.6	63.0	46.5
10	1	80.0	59.0	95.0	70.1	65.0	48.0
12	1.75	140.0	103.3	156.0	115.1	105.0	77.5
12	1.5	142.0	104.8	158.0	116.6	106.0	78.2
12	1.25	145.0	107.0	161.0	118.8	108.0	79.7
14	2	175.0	129.2	200.0	147.6	141.0	104.1
14	1.5	210.0	155.0	235.0	173.4	178.0	131.4
16	2	280.0	206.6	310.0	228.8	200.0	147.6
16	1.5	305.0	225.1	335.0	247.2	240.0	177.1
18	2.5	437.0	322.5	467.0	344.6	380.0	280.4
18	1.5	467.0	344.6	507.0	374.2	397.0	293.0
20	2.5	528.0	389.7	568.0	419.2	450.0	332.1
20	1.5	558.0	411.8	598.0	441.3	475.0	350.6

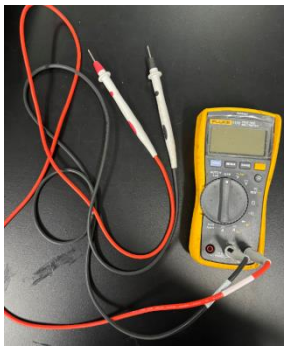
Torque Specification Chart (General Standard Parts)							
Diameter of Thread (mm)	**Pitch value of Thread (mm)**	**Tighten Torque Spec (Mechanical Property of Grade 4.6 for Fasteners components)**					
		Standard Value		**Max Value**		**Min Value**	
		N•m	**Ft-lbs**	**N•m**	**Ft-lbs**	**N•m**	**Ft-lbs**
6	1	4.0	3.0	5.5	4.1	2.5	1.8
8	1.25	8.0	5.9	11.0	8.1	5.0	3.7
8	1	8.5	6.3	11.5	8.5	5.5	4.1
10	1.5	19.7	14.5	29.7	21.9	14.3	10.6
10	1.25	20.8	15.4	25.8	19.0	16.7	12.3
10	1	21.8	16.1	26.5	19.6	17.0	12.5
12	1.75	37.3	27.5	43.3	32.0	28.0	20.7
12	1.5	38.5	28.4	45.0	33.2	29.0	21.4
12	1.25	39.6	29.2	48.0	35.4	30.0	22.1
14	2	61.2	45.2	75.0	55.4	46.8	34.5
14	1.5	74.6	55.1	92.0	67.9	56.0	41.3
16	2	95.0	70.1	115.0	84.9	73.0	53.9
16	1.5	105.0	77.5	133.0	98.2	76.0	56.1
18	2.5	142.9	105.5	178.0	131.4	107.4	79.3
18	1.5	157.6	116.3	190.0	140.2	124.5	91.9
20	2.5	188.0	138.7	230.0	169.7	135.0	99.6
20	1.5	203.7	150.3	243.0	179.3	149.0	110.0

Torque Specification Chart (General Standard Parts)							
Diameter of Thread (mm)	Pitch value of Thread (mm)	Tighten Torque Spec (Mechanical Property of Grade 5.6 for Fasteners components)					
		Standard Value		Max Value		Min Value	
		N•m	Ft-lbs	N•m	Ft-lbs	N•m	Ft-lbs
6	1	4.5	3.3	6.0	4.4	3.0	2.2
8	1.25	10.6	7.8	14.0	10.3	7.0	5.2
8	1	11.0	8.1	15.0	11.1	8.0	5.9
10	1.5	26.0	19.2	33.0	24.4	19.0	14.0
10	1.25	28.0	20.7	34.0	25.1	22.0	16.2
10	1	29.0	21.4	35.0	25.8	23.0	17.0
12	1.75	45.0	33.2	53.0	39.1	37.0	27.3
12	1.5	47.0	34.7	56.0	41.3	38.0	28.0
12	1.25	50.0	36.9	60.0	44.3	40.0	29.5
14	2	81.0	59.8	95.0	70.1	62.0	45.8
14	1.5	90.0	66.4	105.0	77.5	68.0	50.2
16	2	124.0	91.5	150.0	110.7	98.0	72.3
16	1.5	132.0	97.4	160.0	118.1	101.0	74.5
18	2.5	190.0	140.2	220.0	162.4	161.0	118.8
18	1.5	200.0	147.6	230.0	169.7	165.0	121.8
20	2.5	231.6	170.9	272.0	200.7	190.0	140.2
20	1.5	236.6	174.6	285.0	210.3	197.0	145.4

14 Trouble Shooting and FAQ List

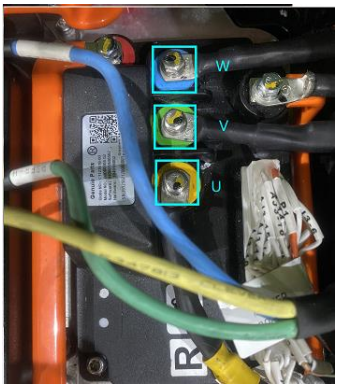
14.1 TR 12/TL 12 Right/Left Wheel Motor Controller Overcurrent

Tool: Multimeter, Computer, Debugging wire, PCAN



Check:

5. Display pop up TR 12/TL 12 fault code.
6. Remove all the load of the vehicle, restart and observe whether the instrument is still reported this fault. If the Fault disappears the cause of the fault is vehicle overload.
7. Check whether the insulation skin of motor U \ V \ W phase wire is broken and copper wire is together at the damage. If the wiring harness is damaged, dispose of the damaged area.
8. Remove the U/V/W phase line of the motor controller. Measure the resistance value between U \ V \ W phases and the motor housing using a multimeter resistance range. See Figure 1.



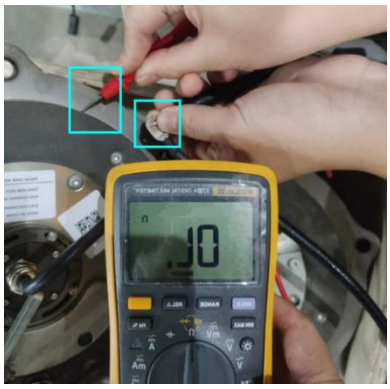
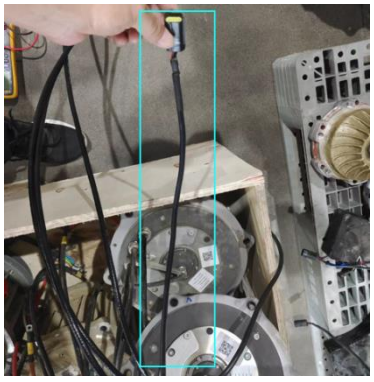



Figure 1 Figure 2 Figure 3

9. If the resistance value is less than 20M Ω, there is a short circuit between the internal winding and the casing of the motor, and the motor needs to be replaced. See Figure 2.
10. If the resistance measured by the motor phase line and the housing is infinite, observe whether there is any damage to the outer packaging of the motor encoder's wiring harness. If the wiring harness is damaged, replace the motor encode. See Figure 3.

11. If the wiring harness of the motor encoder is intact, measure the resistance value between the controller U \ V \ W phases. If the value displayed on the multimeter is below 10 Ω, it indicates that the diode has broken down and caused a short circuit, and a new motor controller needs to be replaced. See Figure 4, 5, 6.

Figure 4

Figure 5

Figure 6

12. If you have replaced a new controller or a new motor, remember to follow the self-learning steps for the motor auto-matching test.

14.2 TR 13/TL 13 Right/Left Wheel Motor Controller Current Sensor Abnormal

Tool: Multimeter, Computer, Debugging wire, PCAN

Check:

13. Display pop up TR 13/TL 13 fault code.
14. Check whether the insulation skin of motor U \ V \ W phase wire is broken and copper wire is together at the damage. If the wiring harness is damaged, dispose of the damaged area.
15. Remove the U/V/W phase line of the motor controller. See Figure 7.

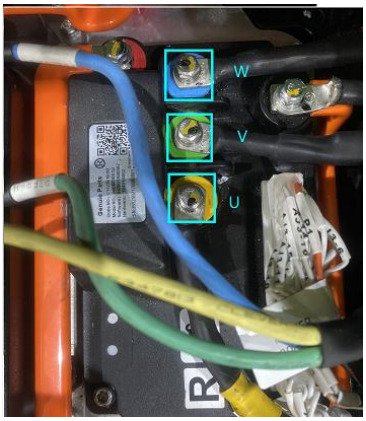


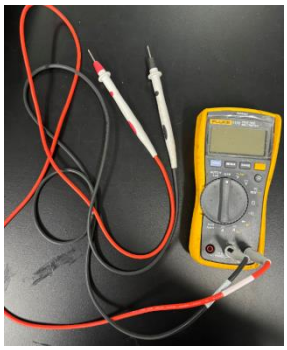
Figure 7

Figure 8

16. Restart the vehicle. If the fault continues to occur, it indicates that the internal current sensor of the motor is damaged and a new motor controller needs to be replaced.
17. If the fault disappears, measure the resistance value between U \ V \ W phases and the motor housing using a multimeter resistance range. If the resistance value is less than 20M Ω, there is a short circuit between the internal winding and the casing of the motor, and the motor needs to be replaced. See Figure 8.
18. If you have replaced a new controller or a new motor, remember to follow the self-learning steps for the motor auto-matching test.

14.3 TR 14/TL 14 Right/Left Wheel Motor Controller Precharge Failed

Tool: Multimeter, Computer, Debugging wire, PCAN



Check:

1. Display pop up TR 14/TL 14 fault code.
2. Keep the vehicle power off state.
3. Set the Multimeter to the diode position and measure the voltage between the U \ V \ W phase and the positive electrode.

4. Set the Multimeter to the diode position and measure the voltage between the U \ V \ W phase and the negative electrode.

5. If the range is 0.45-0.52V, the MOS is normal. Otherwise, it is judged that the MOS is damaged and the controller needs to be replaced.
6. If you have replaced a new controller, remember to follow the self-learning steps for the motor auto-matching test.

14.4 TR 15/TL 15 Right/Left Wheel Motor Controller Severe Undertemp

Tool: Infrared Thermometers, Computer, Debugging wire, PCAN



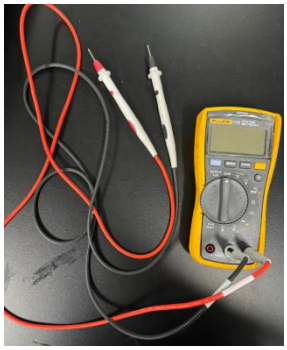
Check:

1. Display pop up TR 15/TL 15 fault code.
2. Check the current ambient temperature. If the ambient temperature is below -40 °C (-40°F), it exceeds the minimum temperature limit. Please wait until the ambient temperature is above -40 °C (-40°F) before using the vehicle.
3. If the ambient temperature is higher than -40 °C (-40°F), the motor controller temperature 0x502 in the vehicle CAN message can be read through the upper computer, and the message can be compared with the ambient temperature. If the difference is too large, it indicates that the internal temperature sensor of the motor controller is faulty and the controller needs to be replaced.

4. If you have replaced a new controller, remember to follow the self-learning steps for the motor auto-matching test.

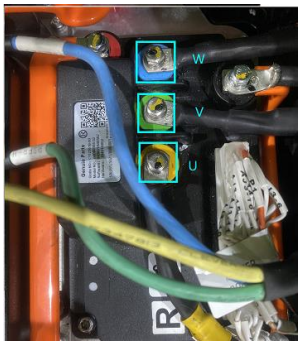
14.5 TR 16/TL 16 Right/Left Wheel Motor Controller Severe Overtemp

Tool: Multimeter, Computer, Debugging wire, PCAN



Check:

1. Display pop up TR 16/TL 16 fault code.
2. Remove all the load of the vehicle, restart and observe if the fault appears. If the fault disappears, the cause of the fault is vehicle overload.
3. Restart the vehicle. If the fault continues to occur, check the connection of the motor U/V/W phase line on the controller and tighten the loose bolts.



4. Restart the vehicle. If the fault continues to occur the motor controller is faulty and the controller needs to be replaced.
5. If you have replaced a new controller, remember to follow the self-learning steps for the motor auto-matching test.

14.6 TR 19/TL 19 Right/Left Wheel Motor Controller Speed Limit Supervision

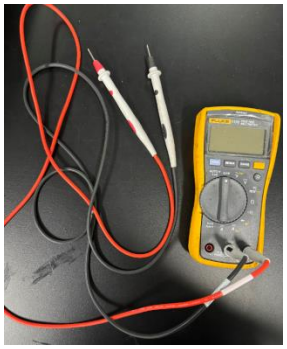
Check:

1. Display pop up TR 19/TL 19 fault code.
2. Please restart the vehicle.

3. Please make sure that the weight of the vehicle and the driving slope are within the specified range.

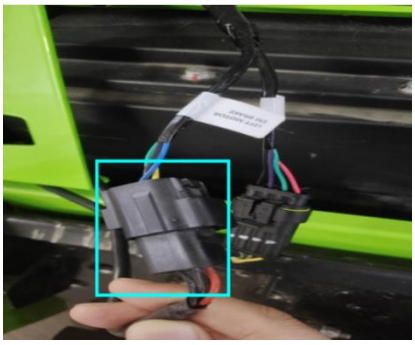
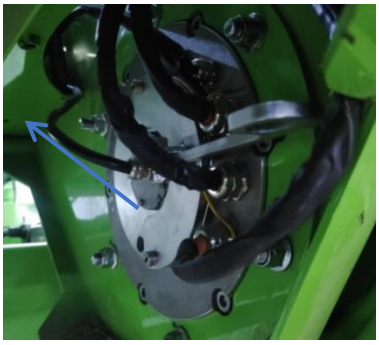
14.7 TR 1A/TL 1A Right/Left Wheel Motor Not Stopped

Tool: Multimeter, Computer, Debugging wire, PCAN



Check:

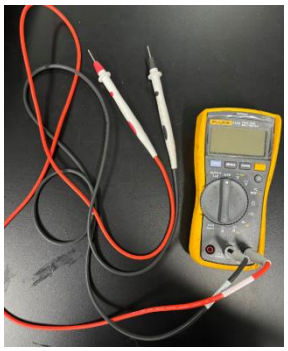
1. Display pop up TR 1A/TL 1A fault code.
2. Please check whether the connector of electromagnetic brake is well connected.

3. Measure the DC voltage of the electromagnetic brake using a multimeter. If the value is proximity 48V, But the vehicle is in a stopped state, the motor controller is faulty and the controller needs to be replaced.
4. If the vehicle can drive normally, when the vehicle comes to a stop the electromagnetic brake does not work. check if the electromagnetic brake release handle is open (The electromagnetic brake of the vehicle is closed in the factory state, If the release handle is tilted up, it indicates that the electromagnetic brake is in the manual release state) if the electromagnetic brake release handle is not opened, the electromagnetic brake is damaged, and the drive motor, needs to be replaced.
5. The electromagnetic brake must be closed manually.
6. If you have replaced a new controller or a new motor, remember to follow the self-learning steps for the motor auto-matching test.

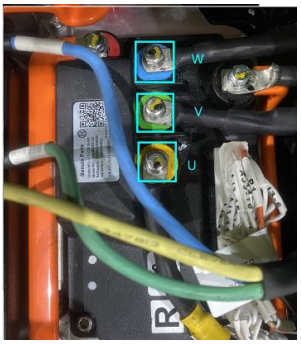
14.8 TR 1E/TL 1E Right/Left Wheel Motor Short

Tool: Multimeter, Computer, Debugging wire, PCAN



Check:

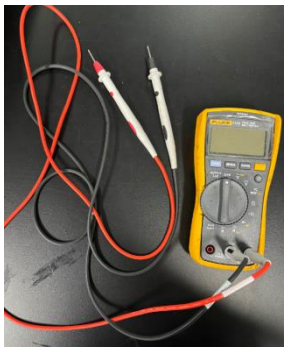
1. Display pop up TR 1E/TL 1E fault code.
2. Check whether the insulation skin of motor U \ V \ W phase wire is broken and copper wire is together at the damage. If the wiring harness is damaged, dispose of the damaged area.
3. Measure the resistance value between U \ V \ W phases and the motor housing using a multimeter.



4. If there is a resistance value during the test, there is a short circuit between the internal winding and the casing of the motor, and the motor needs to be replaced. (Under normal circumstances, the resistance value of the phase line and the motor housing is infinite.)
5. If you have replaced a new motor, remember to follow the self-learning steps for the motor auto-matching test.

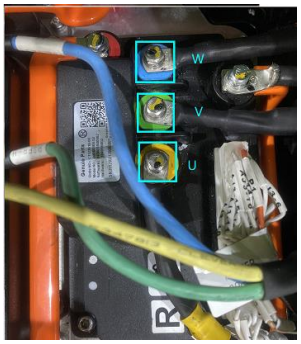
14.9 TR 22/TL 22 Right/Left Wheel Motor Controller Overtemp Cutback

Tool: Multimeter, Computer, Debugging wire, PCAN



Check:

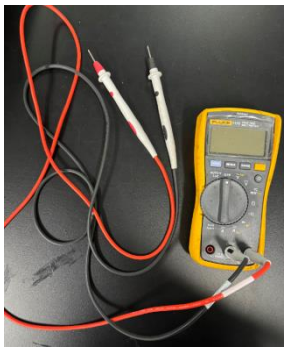
1. Display pop up TR 22/TL 22 fault code.
2. Remove all the load of the vehicle, restart and observe whether the instrument is still reported this fault. If the fault disappears, the cause of the fault is vehicle overload.
3. Restart the vehicle. If the fault continues to occur, check the connection of the motor U/V/W phase line on the controller and tighten the loose bolts.



4. Restart the vehicle. If the fault continues to occur the motor controller is faulty and the controller needs to be replaced.
5. If you have replaced a new controller, remember to follow the self-learning steps for the motor auto-matching test.

14.10 TR 25/TL 25 Right/Left Wheel Motor Controller Ext 5V Supply Failure

Tool: Multimeter, Computer, Debugging wire, PCAN



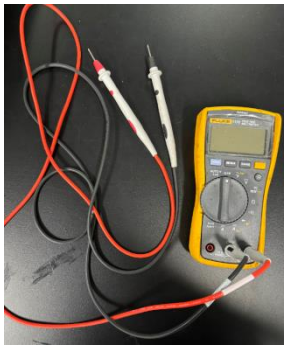
Check:

1. Display pop up TR 25 fault code.
2. Disconnect the connector of the controller and measure the voltage between of pin 1 and pin 5.


3. If the voltage value is outside the range of 5V±10%, the controller fails and the controller needs to be replaced
4. If you have replaced the controller, remember to follow the self-learning steps for the motor auto-matching test.

14.11 TR 26/TL 26 Right/Left Wheel Motor Controller Ext 12V Supply Failure

Tool: Multimeter, Computer, Debugging wire, PCAN



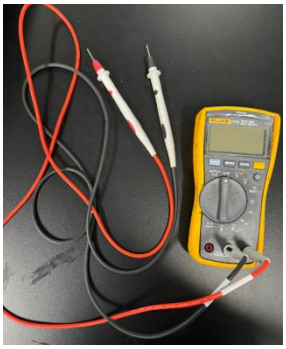
Check:

1. Display pop up TR 26/TL 26 fault code.
2. Disconnect the connector of the controller and measure the voltage between of pin 1 and pin 4.

3. If the voltage value is outside the range of 12V±10%, the controller fails and the controller needs to be replaced
4. If you have replaced the controller, remember to follow the self-learning steps for the motor auto-matching test.

14.12 TR 28/TL 28 Right/Left Wheel Motor Slight Overtemp

Tool: Infrared Thermometers, Multimeter, Computer, Debugging wire, PCAN



Check:

1. Display pop up TR 28/TL 28 fault code.
2. Remove all the load of the vehicle. Wait for a period of time to restart the vehicle. If the fault disappears, the cause of the fault is vehicle overload.
3. Restart the vehicle. If the fault continues to occur. Check the current ambient temperature. Measure the resistance value of the motor temperature sensor.

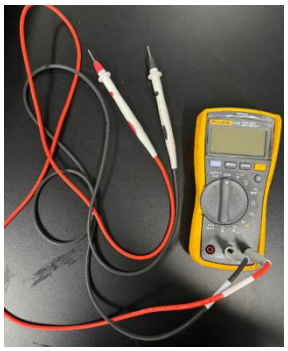
4. Check the table against the actual temperature to see if the resistance value is correct (If at room temperature 25℃ (77℉) environment, it returns to about 560Ω, it means that the temperature sensor is normal. If the resistance value is above 1282Ω, it indicates that the temperature sensor has been damaged, so the motor must be replaced.)

℃	℉	%/（K）	（Ω）			（K）
			MIN	TYP	MAX	
-40	-40	0.97	294	322	350	±8.85
-30	-22	0.94	327	356	385	±8.76
-20	-4	0.91	361	392	423	±8.7
-10	14	0.88	397	430	463	±8.65
0	32	0.87	434	469	504	±8.61
10	50	0.85	475	512	549	±8.58
20	68	0.82	517	556	595	±8.55
25	77	0.80	540	580	620	±8.54
30	86	0.79	562	603	644	±8.53
40	104	0.78	610	653	696	±8.5
50	122	0.75	659	704	749	±8.46
60	140	0.73	711	758	805	±8.42
70	158	0.67	768	814	860	±8.37
80	176	0.63	827	873	919	±8.31
90	194	0.62	887	935	983	±8.25
100	212	0.62	950	1000	1050	±8.17
110	230	0.62	1011	1068	1125	±8.66
120	248	0.58	1077	1138	1199	±9.17
130	266	0.52	1148	1209	1270	±9.69
140	284	0.51	1215	1282	1349	±10.24
150	302	0.50	1279	1352	1425	±10.8

5. If you have replaced a new motor, remember to follow the self-learning steps for the motor auto-matching test.

14.13 TR 29/TL 29 Right/Left Wheel Motor Temperature Sensor Abnormal

Tool: Infrared Thermometers, Multimeter, Computer, Debugging wire, PCAN

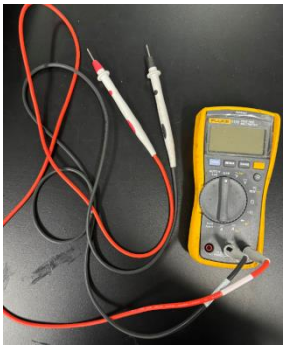



Check:

1. Display pop up TR 29/TL 29 fault code.
2. The method is the same as TR28/TL 28.

14.14 TR 31 Main Contactor Coil Driver Short /Open

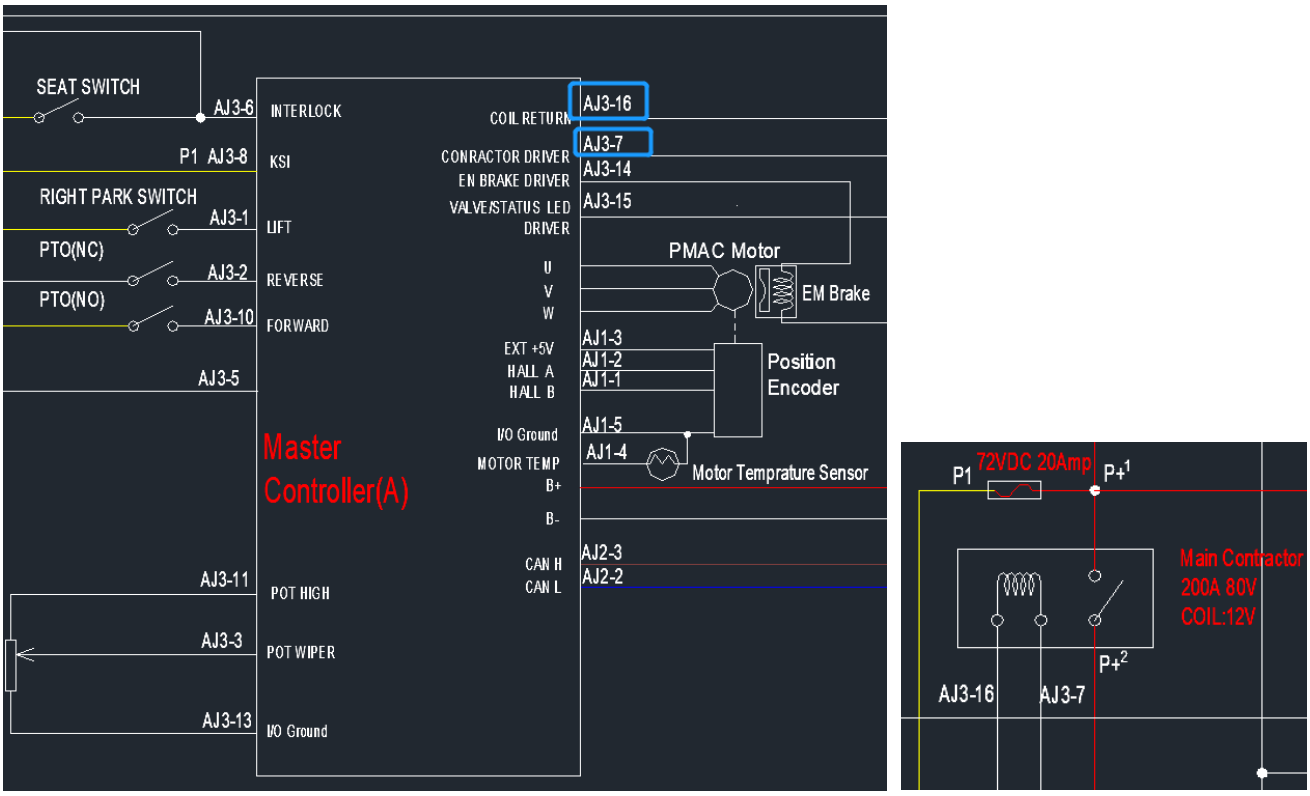
Tool: Multimeter



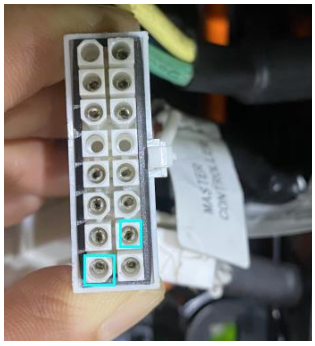
Solution:

1. Coil short/open check.

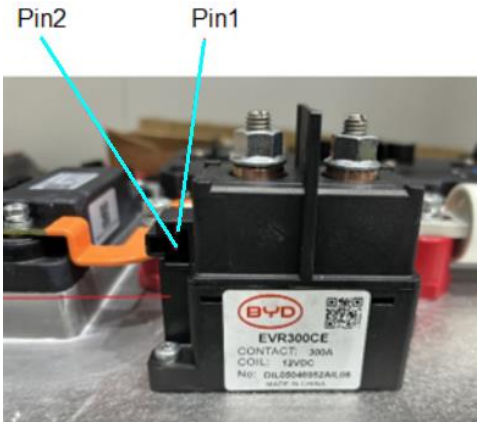
a) Refer to the wiring diagram, we need to locate the coil for the main relay. Using the wiring diagram, we can trace the main contactor to controller pins AJ3-7 (Contactor Driver) and AJ3-16 (Coil Return).



b) Locate the main contactor coil connector and the master controller connector. Find these two devices on the unit. Reference the mower wiring harness and electrical scheme.

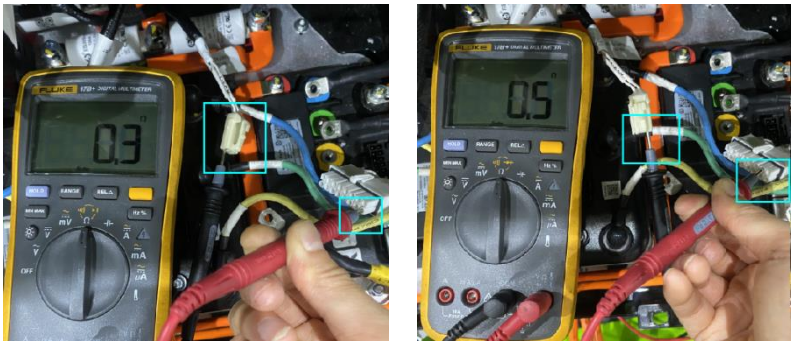


c) Set multimeter to measure resistance, Removing the coil connection, measure the resistance across the coil by putting a lead on pins 1 and 2 shown above 15.8Ω means the coil is normal and not open. A large resistance indicates the coil is open and will need to be replaced.



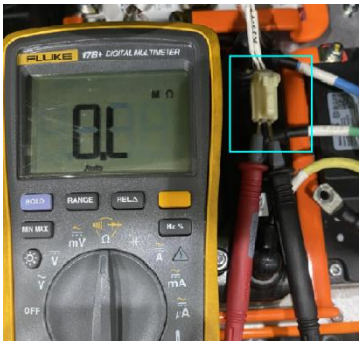
2. Vehicle wiring harness open circuit check.

Now measure the cable from master controller connector to main contactor coil connector. A resistance around 0.5Ω means the cables are normal and not open. It is important to check the wire color and ensure you are measuring between the correct wires.

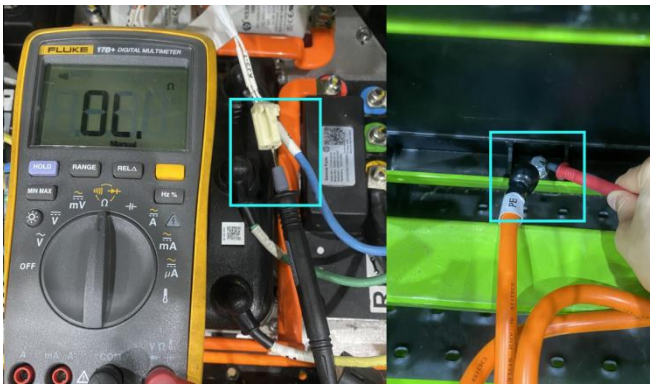
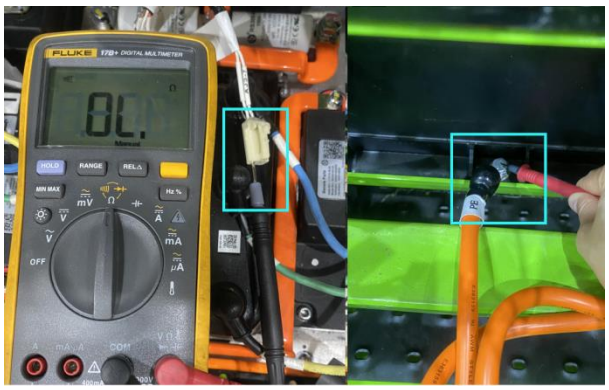


3. Check for short circuit between contactor control harnesses.

a) Disconnect both ends of the connector from the controller and the contactor. Now measure the resistance one lead on A5 and the other on A2. 0L or a large resistance in the Mega ohms means the cables are normal and not shorted to one another.



4. Check contactor control harness for short to ground.

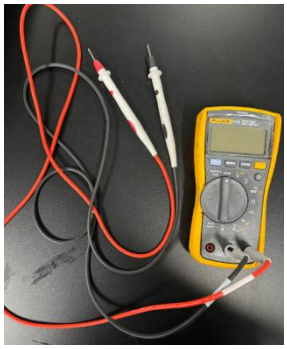



With both ends still disconnected, measure the resistance between the two wires and ground. Use one lead on pin AJ3-7 and the other on chassis ground, and then AJ3-16 and chassis ground. 0L or a large resistance in the Mega ohms means the cables are normal and not ground. (The reliable grounding of the vehicle body is shown in the above figure).

Note: a loose connection can also result in this error. So, if no issues are found during these tests, ensure that the plugs are well seated.

14.15 TR 36/TL 36 Right/Left Wheel Motor Sin/Cos Encoder Abnormal

Tool: Multimeter, Computer, Debugging wire, PCAN



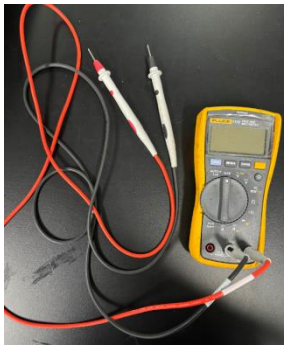
Check:

1. Display pop up TR 36/TL 36 fault code.
2. Check whether the connector joint is secure. Check whether the connector is securely connected.

3. Use a multimeter voltage range to measure the voltage between pin3 and pin5. If the voltage is below 4.5V or above 5.5V, it is determined that the 5V power supply of the controller is faulty and the controller needs to be replaced.
4. If the encoder 5V power supply is normal, but the fault still exists, it is considered that the encoder is faulty. Replace the motor encoder.
5. If you have reassembled the encoder, remember to follow the self-learning steps for the motor auto-matching test.

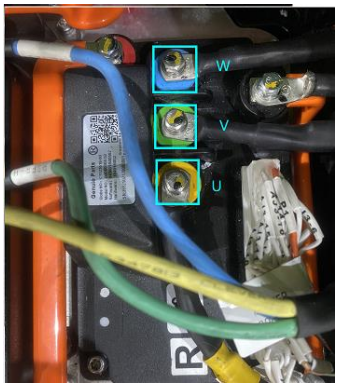
14.16 TR 37/TL 37 Right/Left Wheel Motor Phase Open

Tool: Multimeter, Computer, Debugging wire, PCAN



Check:

1. Display pop up TR 37/TL 37 fault code.
2. Check whether the motor phase line is reliably connected to the controller. Check the positions of the three screws. If they are loose. tighten the loose bolts and Check if screws are found to be damaged. Replace the new screws, if the controller screw hole is damaged and the controller needs to be replaced.

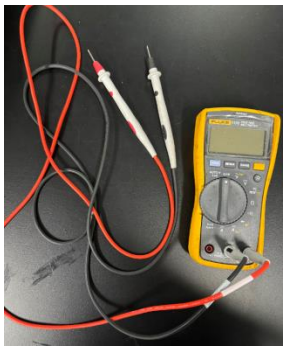


3. Restart the vehicle. If the fault continues to occur, Measure the resistance value between the motor U \ V \ W phases. If the value displayed on the multimeter is 0 or infinity it means that the motor has been damaged inside and a new blade motor needs to be replaced.

4. If you have replaced a new controller or a new motor, remember to follow the self-learning steps for the motor auto-matching test.

14.17 TR 38/TL 38 Main Contactor Welded

Tool: Multimeter, Computer, Debugging wire, PCAN



Check:

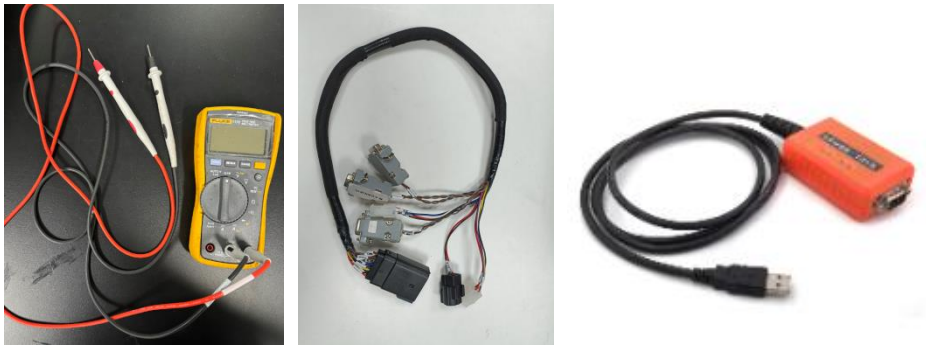
1. Display pop up TR 38 fault code.

2. Measure the resistance value between the main contactors using a multimeter's resistance range. When the resistance is 0 Ω, it means the contactor is ok. If the value is about 1.5Ω, it means the contactor is exactly welded, you just need to replace the contactor.

3. Tear down the contactor, measure the resistance between these two wiring terminals. when the resistance is 0 Ω, it means the contactor is ok. If the value is about 1.5Ω, it means the contactor is exactly welded, you just need to replace the contactor.

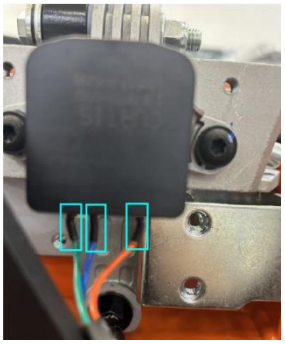
14.18 TR 42/TL 42 Right Throttle Input Abnormal/ Left Throttle Input Abnormal

Tool: Multimeter, Computer, Debugging wire, PCAN

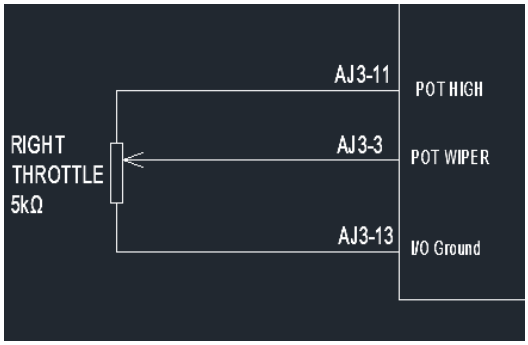


Check:

1. Display pop up TR 42/TL 42 fault code.
2. Check the soldering point of the sensor. Whether there is obverse damage on the root part.



3. Measure the resistance of the throttle sensor, the resistance between AJ3-11 and AJ3-13 is 5kΩ.In the neutral position the resistance between AJ3-3 and AJ3-13, the resistance between AJ3-3 and AJ3-11 are around 2.5kΩ.



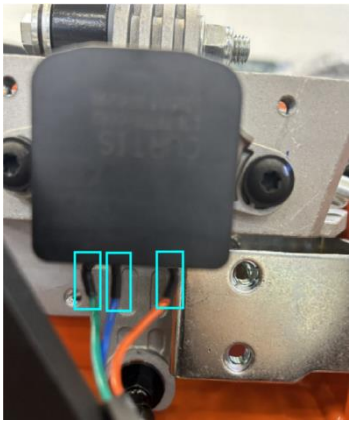
4. Measure any of these two pins between AJ3-11, AJ3-3 and AJ3-13，when the resistance is 0 Ω, it means there is something wrong with the sensor, we need to replace the sensor.
5. If you replace a new potentiometer, please remember to do the auto-matching of throttle.

14.19 TR 43/TL 43 Right/Left Pot2 Wiper High

Tool: Computer, Debugging wire, PCAN

Check:

1. Display pop up TR 43/TL 43 fault code.
2. Check the soldering point of the sensor. Whether there is obverse damage on the root part.



3. Observe whether there is any damage to the outer packaging of the potentiometer wiring harness. If the wiring harness is damaged, replace the potentiometer.
4. If you replace a new potentiometer, please remember to do the auto-matching of throttle.

14.20 TR 46/TL 46 Right/Left Wheel Motor Controller NV Memory Failure

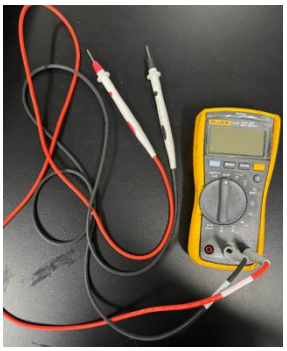
Tool: Computer, Debugging wire, PCAN

Check:

1. Display pop up TR 46/TL 46 fault code.
2. Restart Vehicle.
3. If this fault code persists, please replace a new controller. Refer to the service manual for the specific disassembly and assembly steps.
4. If you have replaced a new controller, remember to follow the self-learning steps for the motor auto-matching test.

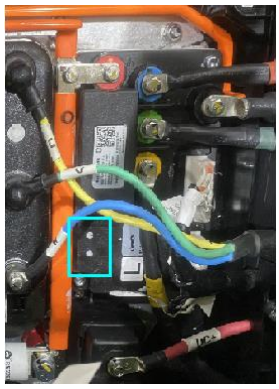
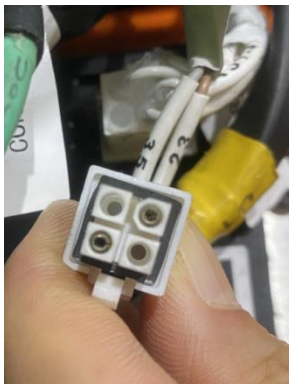
14.21 TR 52/TL 52 Left/Right Wheel Motor Controller CAN Communication Abnormal

Tool: Multimeter, Computer, Debugging wire, PCAN

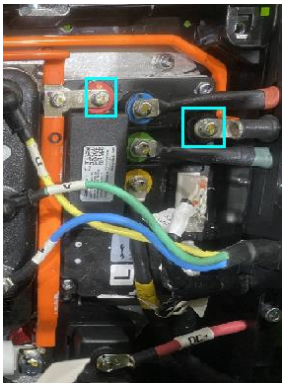


Check:

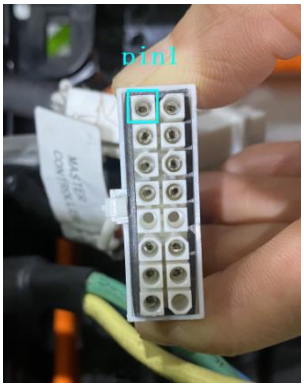
1. Refer to the service manual to remove the plastic parts, locate the left drive controller, observe the main control indicator light for 20 seconds, and check if the indicator light is flashing.

2. If the indicator light of the left drive controller flashes, it indicates that the power supply of the left drive controller is abnormal. Check if the left drive controller plug-in is loose, check if the left drive controller plug-in CAN-H and CAN-L have withdrawn the needle, and if there is garbage on the surface of the plug-in, which causes poor contact of the plug-in.
3. If the indicator light of the left drive controller does not flash, it indicates that the power supply of the left drive controller is abnormal. Use a wrench to confirm if the bolts at B- are tight and there is no sign of looseness.



4. If the bolts are tightened, use a multimeter to check if the voltage at point Pin 1 is above 70V. If the voltage at Pin 1 is below 70V, observe whether the terminal at Pin 1 is loose or detached. If everything is normal at point Pin 1, replace the left controller.

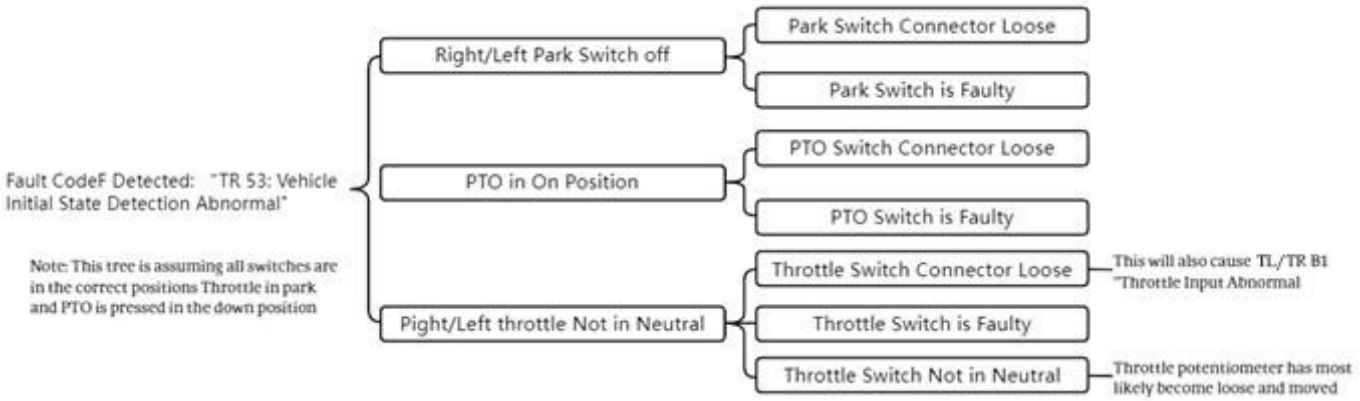


5. If you have replaced a new controller, remember to follow the self-learning steps for the motor auto-matching test.

14.22 TR 53 Vehicle Initial State Detection Abnormal

Possible Cause:

This error occurs when one of the vehicles start up checks are found to not be in the correct state.



Solution:

1. Right/Left parking switch check.

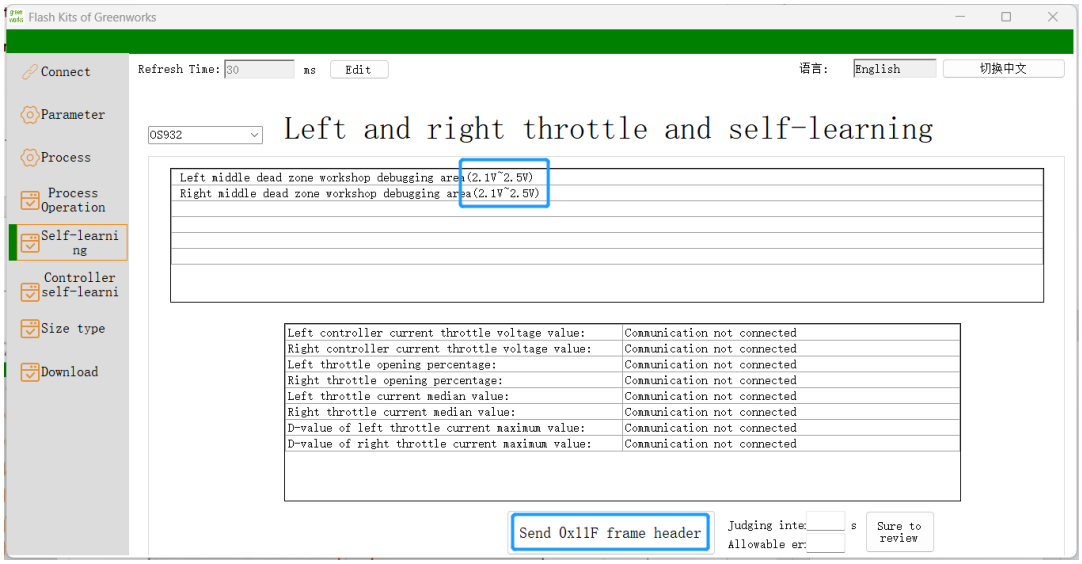
a) Check that the lever is in the park position.

b) If the operator sits on the seat and does not do any operation, check whether the P gear icon on the instrument is lit, if the P gear icon is not lit, detect whether the park switches and wiring on the left and right sides are normal.

2. Check the PTO switch, the system detects that the PTO switch is not in OFF position, make sure to press the PTO switch, if the problem persists, start troubleshooting the PTO switch and wiring.

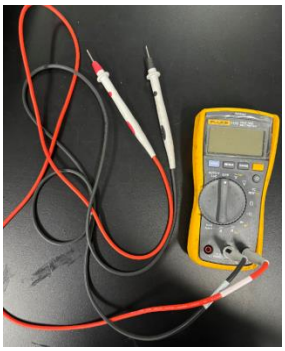
3. Throttle nature check.

a) Use the GLOYEL host computer to check that the voltage parameters of the left and right park positions are not within the set range. If not in the nature position, enter the self-learning interface and click “send 0X11F frame header” icon. Send 0x11F frame header



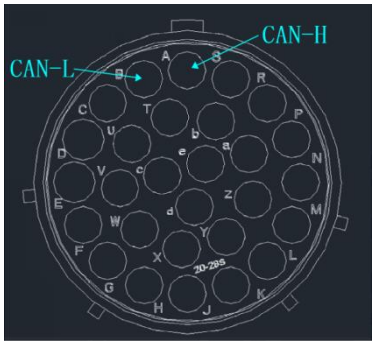
14.23 TR 55 BMS CAN Communication Abnormal

Tool: Multimeter, Computer, Debugging wire, PCAN

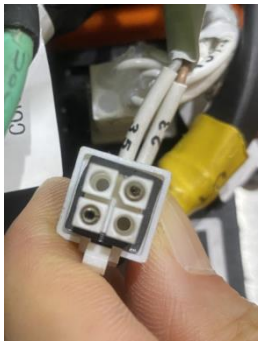


Check:

1. Check if the BMS plugin is loose, check if the BMS plugin CAN-H and CAN-L have retracted needles, and if there is any debris on the surface of the BMS plugin, causing poor contact of the plugin.



2. If there is no problem with the battery pack plugin, use a multimeter to check if the CAN-H and CAN-L connections between the right drive controller plugin and the battery pack plugin are conductive. If there is no continuity, replace the main harness of the entire vehicle.



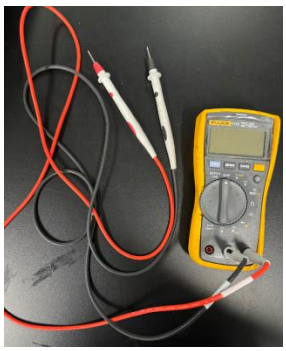
14.24 TR 56 Operator Presence Detection Abnormal

Check:

1. Display pop up TR 56 fault code.
2. The operator is not in the correct operating position. Please ensure you are in the correct operating position to resume operation.
3. Right side throttle lever is not in neutral position. Please ensure right throttle lever is in returned to park position to resume operation.
4. Left side throttle lever is not in neutral position. Please ensure left throttle lever is in returned to park position to resume operation.

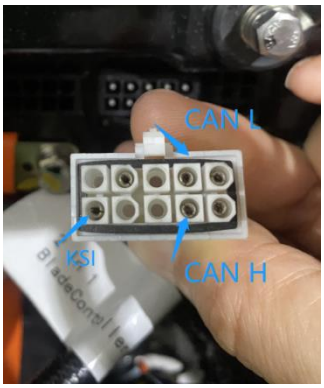
14.25 TR 58 Right Blade Motor Controller CAN Communication Abnormal

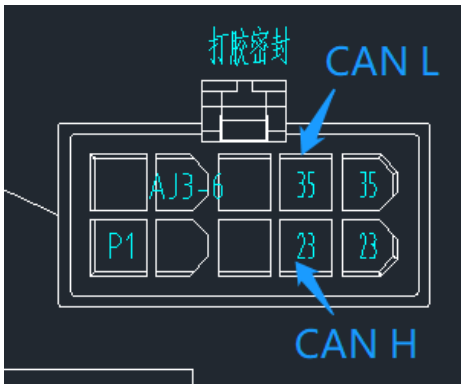
Tool: Multimeter, Computer, Debugging wire, PCAN



Check:

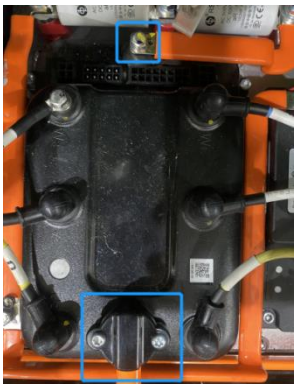
1. Display pop up TR 58/63/65 fault code.
2. Check whether the blade controller plug-in CAN-H, KAN-L, KSI is loose, and the three-in-one cutter controller plug-in surface has garbage, resulting in poor contact with the plug-in.





3. If this fault code persists, Use the multimeter to check whether the CAN-H, CAN-L conductivity. If not conductivity, replace the vehicle main line harness.

4. Restart the vehicle. If the fault continues to occur, check the connection line on the controller and tighten the loose bolts.



5. Use the multimeter voltage range to check whether the voltage at the KSI pin is greater than 70V. If less than 70V, replace the main line bundle. If it is greater than 70V, brush the blade controller program.
6. Restart the vehicle. If the fault continues to occur replace the blade controller.
7. If you have replaced a new controller, remember to follow the self-learning steps for the motor auto-matching test.

14.26 TR 5A/TL 5A Internal Communication Failure

Tool: Computer, Debugging wire, PCAN

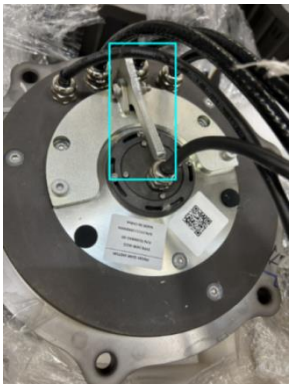
Check:

1. Display pop up TR 5A/TL 5A fault code.
2. Keep the vehicle power off, check whether wheels can be turned freely.
3. If the wheels cannot rotate, please update the controller program.
4. If this fault code persists, please replace a new controller. Refer to service manual for the specific disassembly and assembly steps.
5. If you have replaced a new controller, remember to follow the self-learning steps for the motor auto-matching test.

14.27 TR 5B/TL 5B Right/Left Parking Brake Manually Disengaged and Not Reset

Check:

1. Display pop up TR 5B fault code.
2. Please keep the brake lever at unreleased state.



14.28 TR 61 GPS Module CAN Communication Abnormal

Tool: Multimeter, Computer, Debugging wire, PCAN

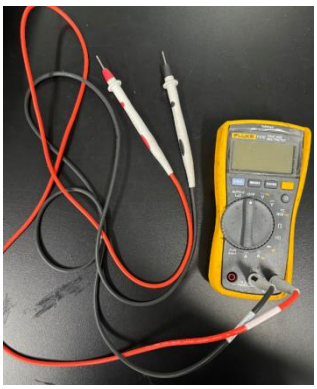


Check:

1. Display pop up TR 61 fault code.
2. First, check whether the connector of the GPS box is firmly inserted and whether the pin is withdrawn. If there is no withdrawn pin, reinsert it.
3. Secondly, check whether the GPS box indicator light is on. If it is on, there is something wrong with the box and it needs to be replaced with a new box. If it is not bright, use a multimeter to measure whether the 12V power supply is normal, if it is not normal, check whether the 12V line is damaged, if it is damaged, it needs to be repaired. If the 12V supply line is not damaged, replace the GPS box.
4. To replace the new GPS box, it is necessary to retrofit the box and the vehicle.

14.29 TR 63 Left Blade Motor Controller CAN Communication Abnormal

Tool: Multimeter, Computer, Debugging wire, PCAN

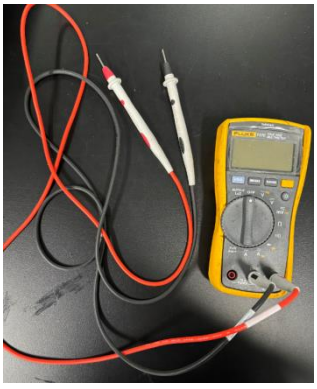
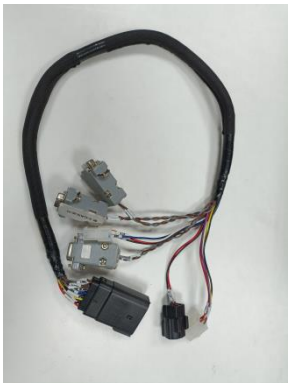


Check:

1. Display pop up TR 58/63/65 fault code.
2. Same as TR 58.

14.30 TR 65 Middle Blade Motor Controller CAN Communication Abnormal

Tool: Multimeter, Computer, Debugging wire, PCAN


Check:

1. Display pop up TR 58/63/65 fault code.
2. Same as TR 58.

14.31 TR 67 Blade Speed Exceeds Limit

Tool: Computer, Debugging wire, PCAN

Check:

1. Display pop up TR 67 fault code.
2. Restart vehicle.
3. If this fault code persists, please replace a new controller. Refer to the service manual for the specific disassembly and assembly steps.
4. If you have replaced a new controller, remember to follow the self-learning steps for the motor auto-matching test.

14.32 TR 73/TL 73 Right/Left Wheel Motor Stall Detected

Tool: Computer, Debugging wire, PCAN

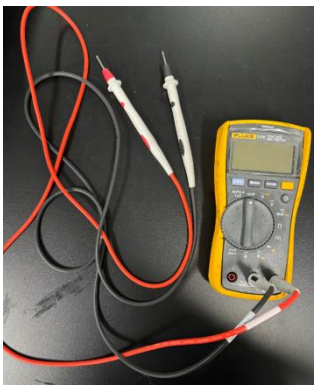
Check:

1. Display pop up TR 73/TL 73 fault code.
2. Use the controller application to check whether the controller software version is correct. If the version is incorrect, update the controller programmer.

3. Restart the vehicle. If the fault continues to occur, check whether the motor power is insufficient. If the vehicle in the downhill, due to the motor power is not enough, resulting in motor stall, the motor needs to be replaced. Refer to service manual for the specific disassembly and assembly steps.
4. Check the motor has learned zero position. If there is no self-learning zero done, please complete the self-learning.
5. If you have replaced a new controller or a new motor, remember to follow the self-learning steps for the motor auto-matching test.
6. Please check that the encoder of the motor is well assembled.

14.33 TR A2/TL A2 Right/Left Wheel Motor Controller EM Brake Driver Short/Open

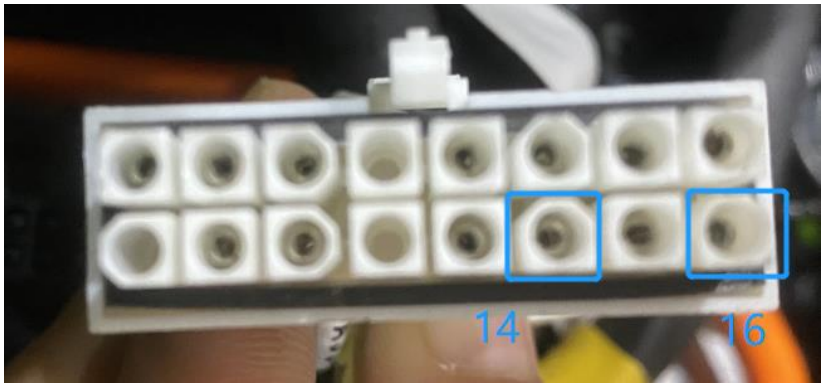
Tool: Multimeter, Computer, Debugging wire, PCAN



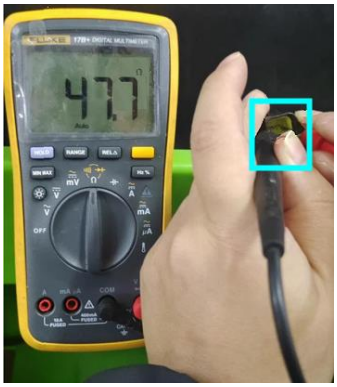
Check:

1. Display pop up TR A2/TL A2 fault code.
2. Pull out the electromagnetic brake communication plug and the main controller communication plug on the right drive motor, check if there is a pin on the connector that returns the PIN, and check if the PIN and the connector can be fixed.


3. Reinsert the plugin and restart the vehicle. If the fault still persists, use a multimeter to turn on and off the gear, and measure whether the pin14 and pin16 are connected to the pin14 and pin16 on the main control communication plug.



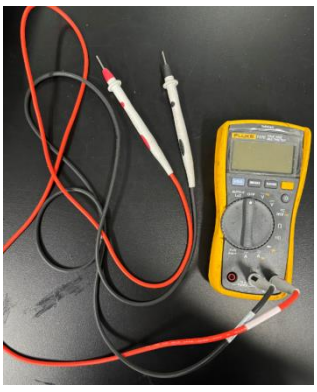
4. Measure the resistance between the pin14 and the pin16 of the electromagnetic brake plug on the drive motor using a multimeter in the ohm range. If it does not exist or approaches zero infinitely, it indicates that the electromagnetic brake on the drive motor is damaged and needs to be replaced.



5. If you have replaced a new motor, remember to follow the self-learning steps for motor auto-matching test.

14.34 TR A3 Front ETO Contactor Coil Driver Short/Open

Tool: Multimeter, Computer, Debugging wire, PCAN

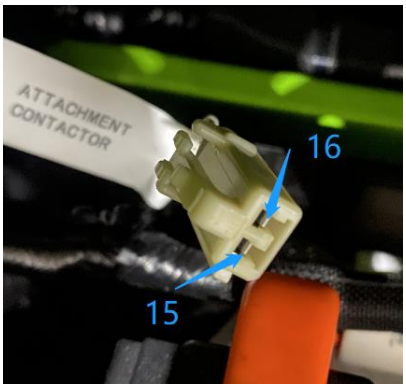


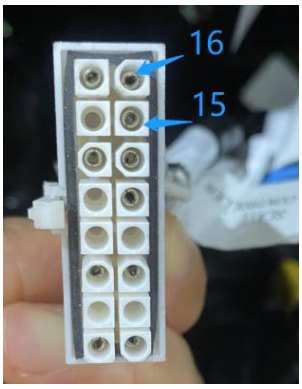
Check:

1. Display pop up TR A3 fault code.

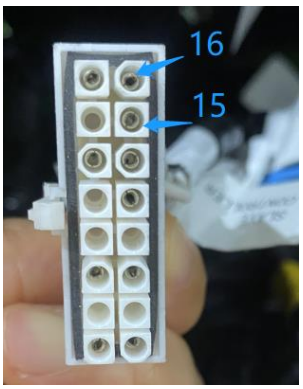
2. First pull out the communication plug-in on the front ETO relay, check whether the terminal in the connector is out of the pin, if the pin is out, please deal with it, and insert the connector into the relay.

3. Power on the device again, if the fault still exists. Pull out the slave controller connector and the front ETO coil connector, and measure whether the Pin15 and Pin16 of the connector on the relay is connected to the Pin15 and Pin16 of the slave controller connector.





4. The multimeter is set to on-off, plug in the plug-in on the relay, and measure whether the Pin15 and Pin16 on the slave communication connector are disconnected. If the circuit is open, the front ETO relay is damaged and needs to be replaced.

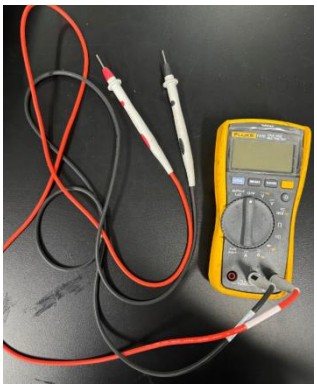


5. Insert the main control communication plug, unplug the relay plug, use a multimeter diode gear, connect the red probe on the left side of the plug, and connect the black probe to the right side of the plug. If there is no value, the controller is damaged and needs to be replaced.

6. If you have replaced a new controller, remember to follow the self-learning steps for the motor auto-matching test.

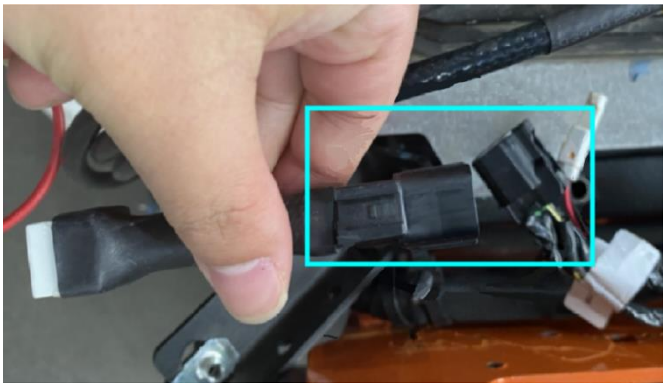
14.35 TR A4 Auto Power off Contactor Coil Driver Short/Open

Tool: Multimeter, Computer, Debugging wire, PCAN

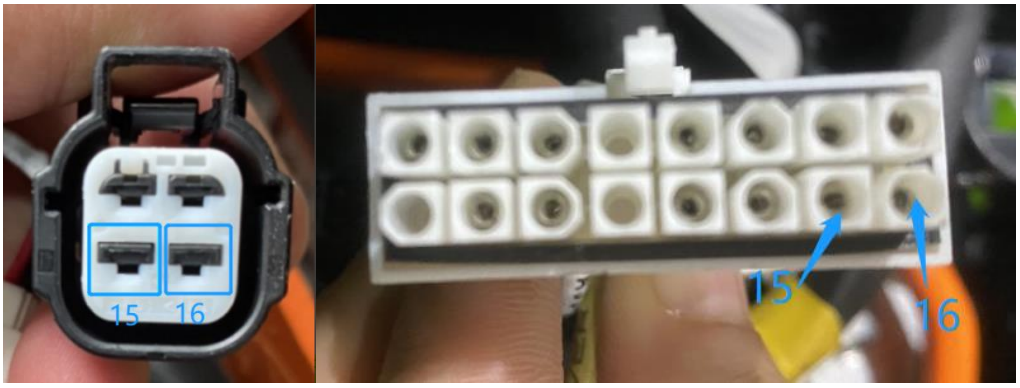


Check:

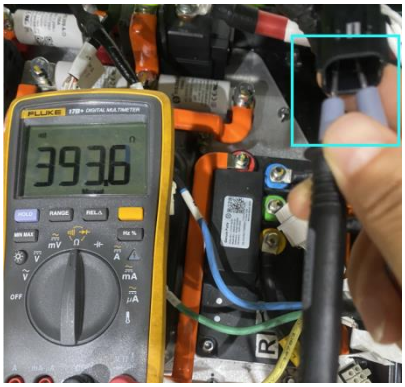
1. Display pop up TR A4 fault code.
2. Unplug the one click start relay from the vehicle wiring harness and check if there is a PIN retraction phenomenon at the terminals in the connector. If there is, reinsert the PIN into the connector and check if the terminals still fall off.

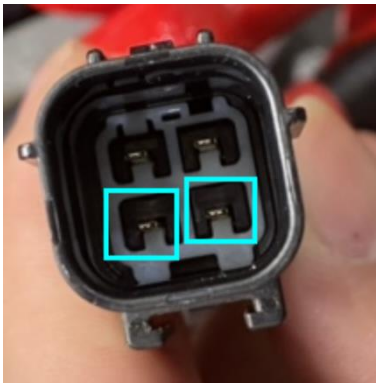


3. Reinsert the plugin and restart the vehicle. If the fault still persists, use multimeter on/off gear, and measure whether Pin15 and Pin16 are connected to Pin15 and Pin16 on the main control communication plug.

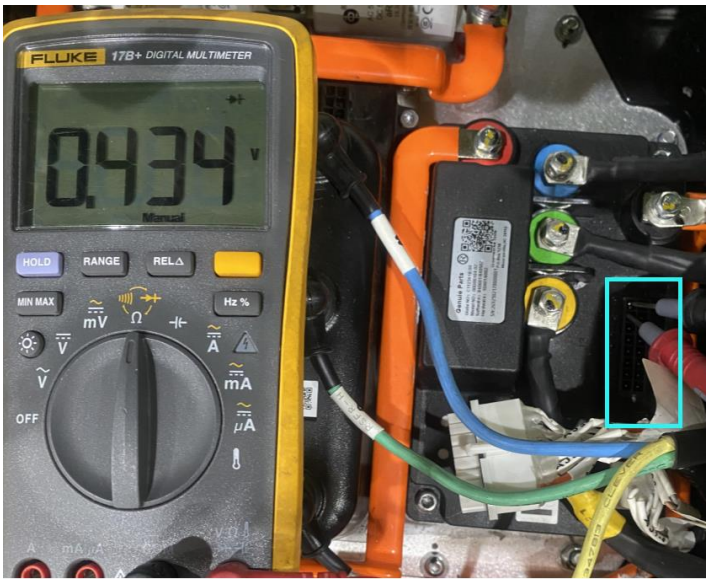


4. Using a multimeter ohmmeter, measure whether there is resistance value on the left and right sides of connector second row on the relay. If not, it indicates that the one click start relay is damaged and needs to be replaced.





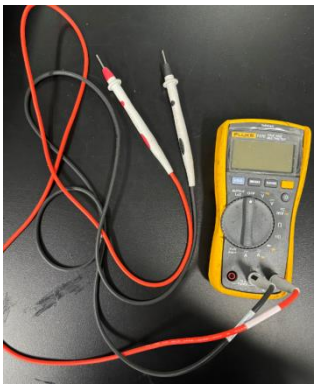
5. Unplug the main control communication plugin. Using a multimeter diode range, connect the red probe to Pin15 of the main controller and the black probe to Pin16 of the main controller. If there is no value, it indicates that the controller is damaged and needs to be replaced.



6. If you have replaced a new controller, remember to follow the self-learning steps for motor auto-matching test.

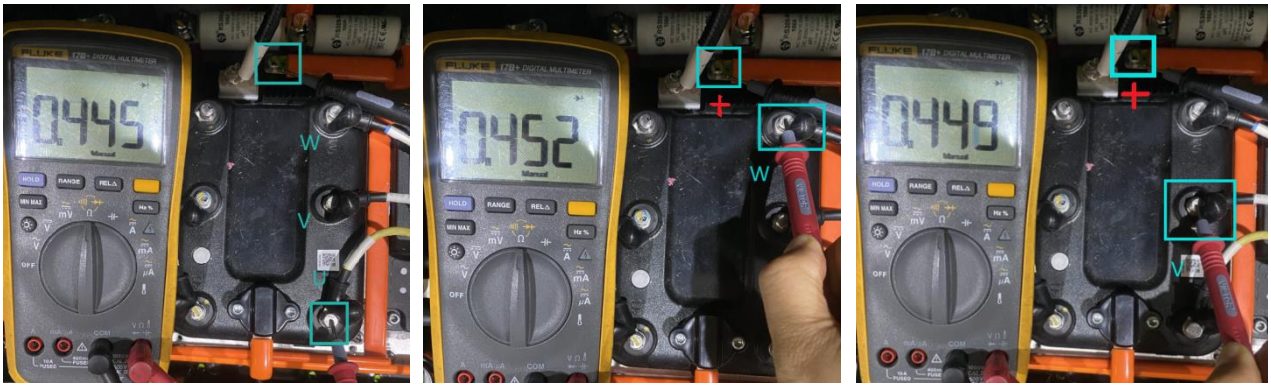
14.36 ML 11/MR 11 Left/Right Blade Motor Controller Hardware Overvoltage or Overcurrent

Tool: Multimeter, Computer, Debugging wire, PCAN

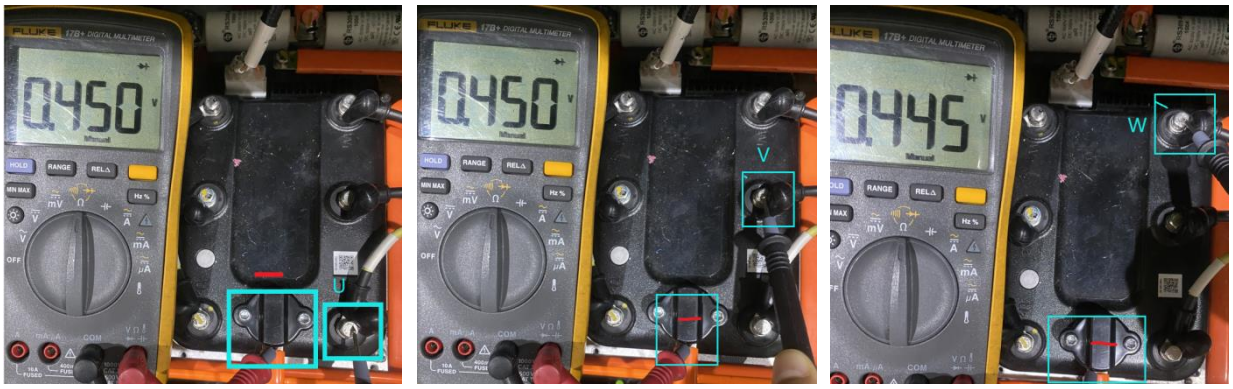


Check:

1. Display pop up ML 11 /MM 11 /MR 11 fault code.
2. Set the Multimeter to the diode position and measure the voltage between the U \ V \ W phase and the positive electrode.



3. Set the Multimeter to the diode position and measure the voltage between the U \ V \ W phase and the negative electrode.

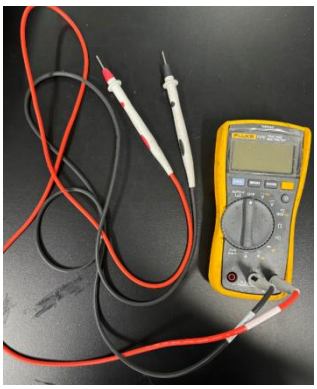


4. If the range is 4.7-5.0V, the MOS is normal. Otherwise, it is judged that the MOS is damaged and the controller needs to be replaced. Refer to the service manual for the specific disassembly and assembly steps.
5. If normal when the vehicle is powered on, but fault occurs after pulling up the PTO switch, keep the vehicle power off state. Check for foreign objects under the deck.
6. Raise the deck and manually move the blades to check if the motor can rotate smoothly. If the motor is noticeably stuck, it is necessary to replace the blade motor.

7. If you have replaced a new controller or a new motor, remember to follow the self-learning steps for the motor auto-matching test.

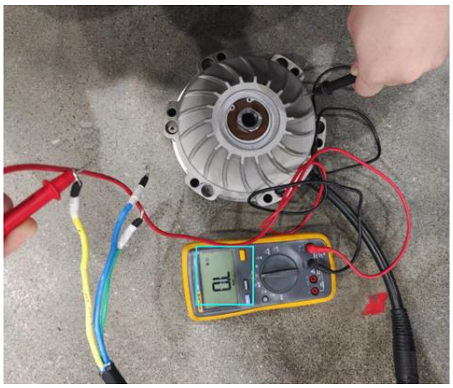
14.37 ML 12/MR 12 Right/Left Blade Motor Controller Overcurrent

Tool: Multimeter, Computer, Debugging wire, PCAN



Check:

1. Display pop up ML 12//ML 12 fault code.
2. Move the vehicle to an open area without grass, restart the blade motor. If the fault disappears, it indicates the blade motor is overload, which causes the controller to heat up, please reduce load.
3. Check whether the insulation skin of motor U \ V \ W phase wire as well as copper wire are broken. If the wiring harness is damaged, dispose of the damaged area.
4. Remove the U/V/W phase line of the motor controller. Measure the resistance value between U \ V \ W phases and the motor housing using a multimeter resistance range.



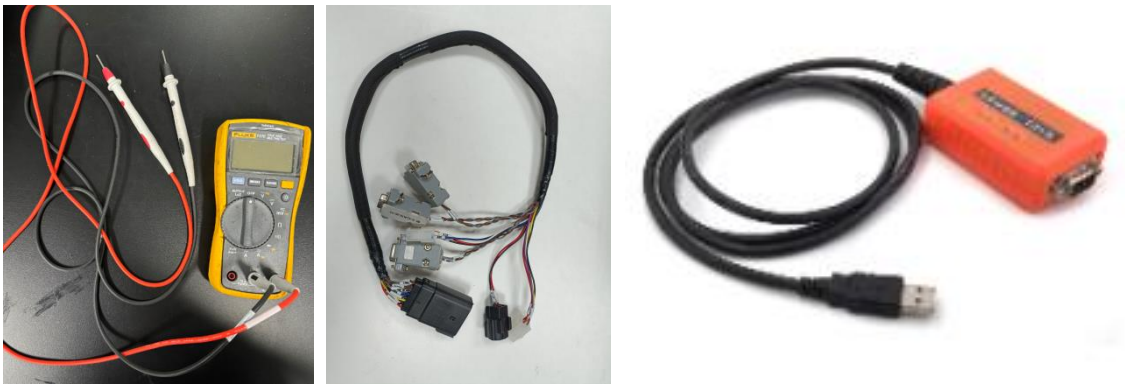
5. If the resistance value is below 20M Ω, there is a short circuit between the internal winding and the housing of the motor, and the motor needs to be replaced.
6. If the resistance measured by the motor phase line and the housing is infinite, observe whether there is any damage to the outer packaging of the motor encoder's wiring harness. If the wiring harness is damaged, replace the motor encoder.

7. If the wiring harness of the motor encoder is intact, measure the resistance value between the controller U \ V \ W phases. If the value displayed on the multimeter is below 10 Ω, it indicates that the diode has broken down and caused a short circuit, and a new motor controller needs to be replaced.

8. If you have replaced a new controller or a new motor, remember to follow the self-learning steps for the motor auto-matching test.

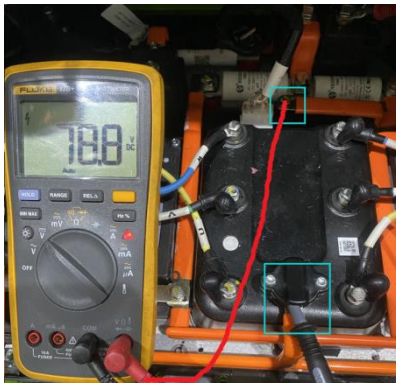
14.38 ML 13/MR 13 Left/Right Blade Motor Controller Overvoltage

Tool: Multimeter, Computer, Debugging wire, PCAN



Check:

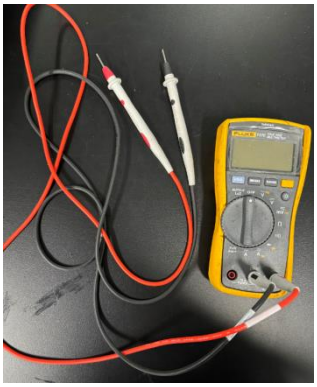
1. Display pop up ML 13/MR 13 fault code.
2. Restart Vehicle.
3. If this fault code persists with vehicle power on, please use a multimeter to measure the voltage between controller B+ and B- voltages.
4. If the value displayed on the multimeter is below 92V, it indicates that the internal voltage sensor of the motor controller is faulty and the controller needs to be replaced. Refer to the service manual for the specific disassembly and assembly steps.



5. If the value displayed on the multimeter is above 92V, it indicates a battery failure and the battery system needs to be checked.

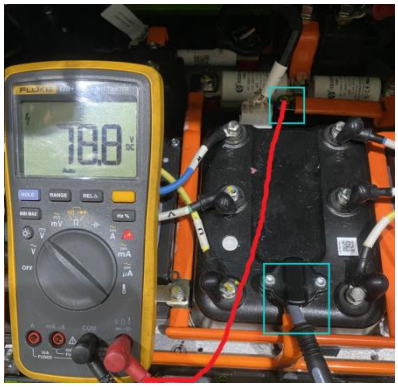
14.39 ML 14/MR 14 Left/Right Blade Motor Controller Undervoltage

Tool: Multimeter, Computer, Debugging wire, PCAN



Check:

1. Display pop up ML 14/MR 14 fault code.
2. Restart Vehicle.
3. If this fault code persists, please use a multimeter to measure the bus DC voltage of the controller.



4. If the value displayed on the multimeter is above 72V, it indicates that the internal voltage sensor of the motor controller is faulty and the controller needs to be replaced. Refer to the service manual for the specific disassembly and assembly steps.
5. If the value displayed on the multimeter is below 72V, it indicates a battery failure and the battery system needs to be checked.

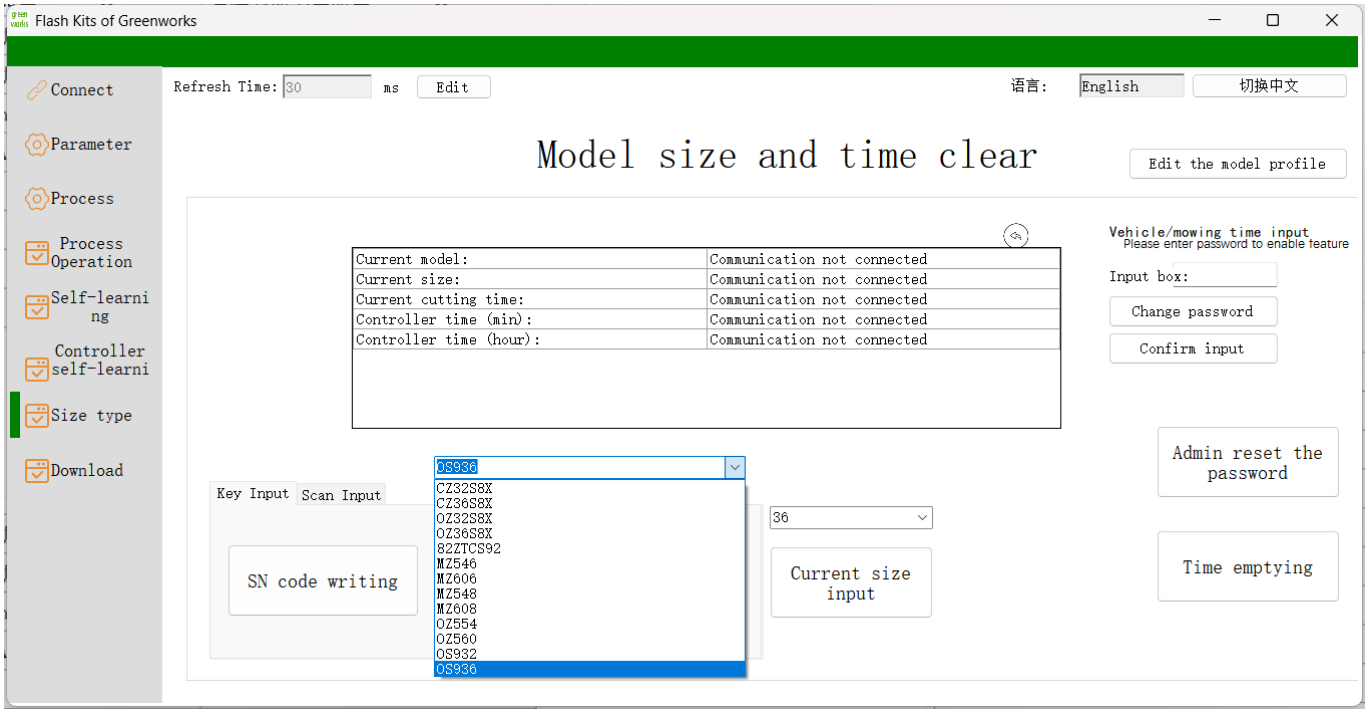
14.40 ML 15 Current Parameter Mismatch Fault

Tool: Multimeter, Computer, Debugging wire, PCAN



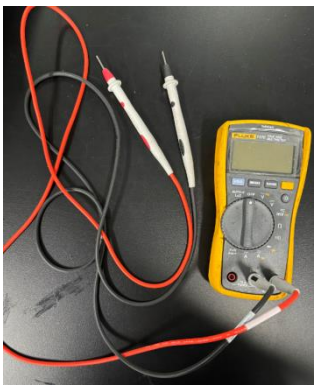
Fault cause: the blade controller program is inconsistent with the blade size.

1. Check whether the blade controller program is correct, if not, update the controller program; If correct, check whether the vehicle model chosen is correct, if not, write the correct model.



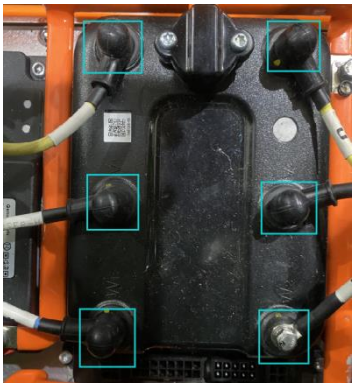
14.41ML 16/MR 16 Left/Right Blade Motor Phase Open

Tool: Multimeter, Computer, Debugging wire, PCAN

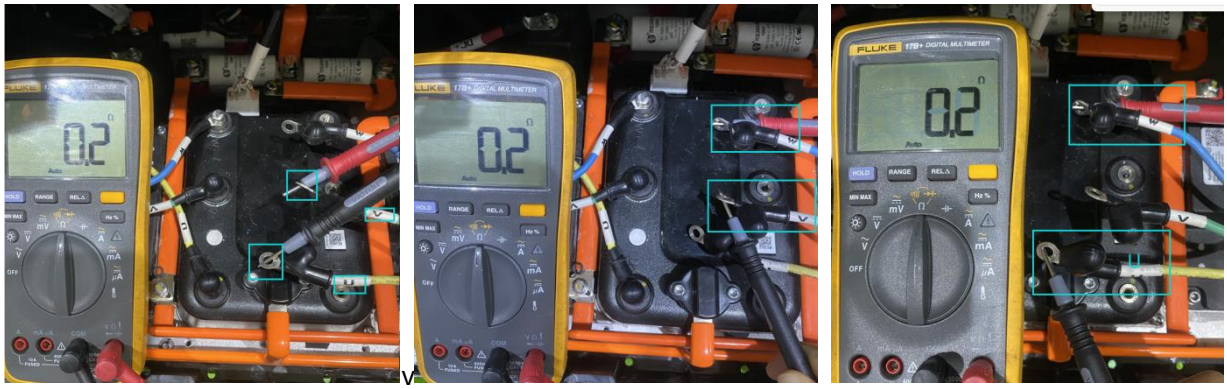


Check:

1. Display pop up ML 16/MR 16 fault code.
2. Check whether the motor phase line is reliably connected to the controller. Check the positions of the six screws. If they are loose, tighten the loose bolts and check if screws are damaged. Replace with new screws. If the controller screw hole is damaged, the controller needs to be replaced.



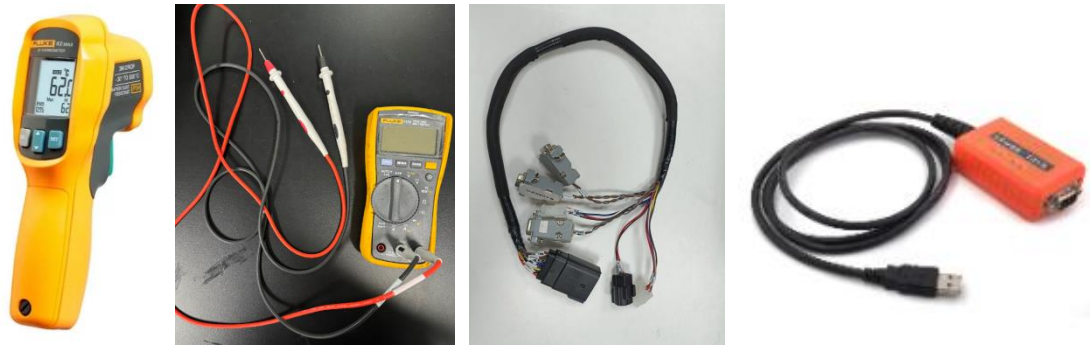
3. Restart the vehicle. If the fault continues to occur, measure the resistance value between the motor U \ V \ W phases. If the value displayed on the multimeter is 0 or infinity it means that the motor has been damaged inside and a new blade motor needs to be replaced.



4. If you have replaced a new controller or a new motor, remember to follow the self-learning steps for the motor auto-matching test.

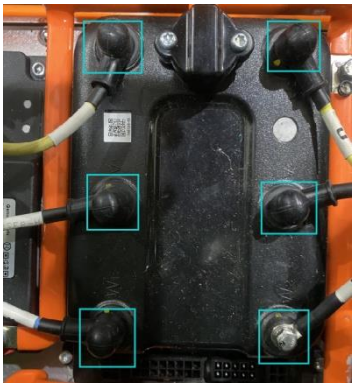
14.42 ML 17/MR 17 Left/Right Blade Motor Controller Severe Overtemp

Tool: Infrared Thermometers, Multimeter, Computer, Debugging wire, PCAN



Check:

1. Display pop up ML 17/MR 17 fault code.
2. Move the vehicle to an open area without grass, restart the blade motor. If the fault disappears, it indicates the blade motor is overload, which causes the controller to heat up, please reduce load.
3. Restart the vehicle. If the fault continues to occur, check the connection of the motor U/V/W phase line on the controller and tighten the loose bolts.

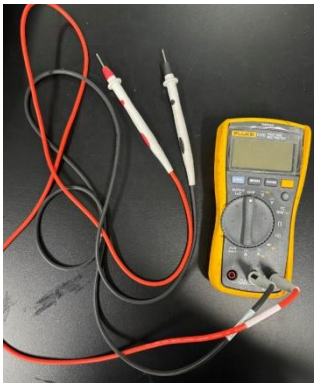


4. Restart the vehicle. If the fault continues to occur, measure the temperature of the blade controller, and read the feedback temperature of the blade control through the upper computer ToolsForCAN-PlatformChecker for comparison. If the difference is significant, it indicates that the internal temperature sensor of the controller is faulty and needs to be replaced with a new blade controller.

5. If you have replaced a new controller, remember to follow the self-learning steps for the motor auto-matching test.

14.43 ML 18/MR 18 Left/Right Blade Motor Controller EEPROM Abnormal

Tool: Multimeter, Computer, Debugging wire, PCAN



Check:

1. Display pop up ML 18/MR 18 fault code.
2. Restart Vehicle.
3. If this fault code persists, please replace a new blade controller. Refer to the service manual for the specific disassembly and assembly steps.
4. If you have replaced a new controller, remember to follow the self-learning steps for the motor auto-matching test.

14.44 ML 21/MR 21 Left/Right Blade Motor Stall Detected

Tool: Computer, Debugging wire, PCAN

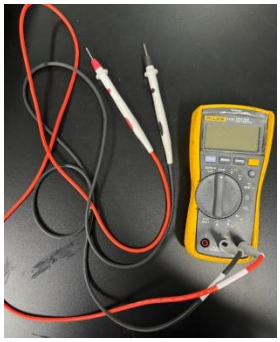
Check:

1. Display pop up ML 21 /MR 21 fault code.
2. Check whether the controller software version is correct through the upper computer “ToolsForCAN-PlatformChecker”. If the version is incorrect, update with the correct version of the program.

3. Restart the vehicle. If this fault code persists, please replace a new blade controller. Refer to the service manual for the specific disassembly and assembly steps.
4. Restart the vehicle. If this fault code persists, check whether the motor power is insufficient. If the vehicle in the downhill, due to the motor power is not enough, resulting in motor stall, the Blade Motor needs to be replaced. Refer to the service manual for the specific disassembly and assembly steps.
5. If you have replaced a new controller or a new motor, remember to follow the self-learning steps for the motor auto-matching test.

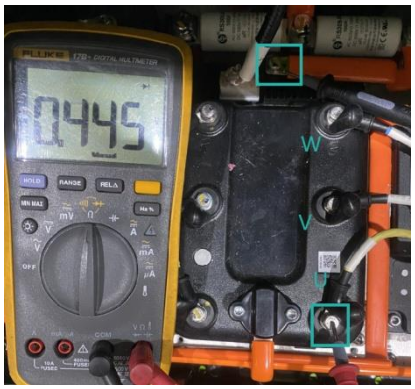
14.45 ML 23/MR 23 Left/Right Blade Motor Controller Precharge Failed

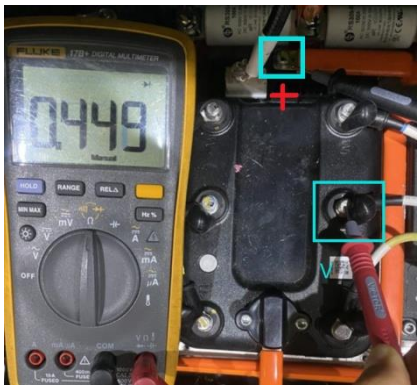
Tool: Multimeter, Computer, Debugging wire, PCAN



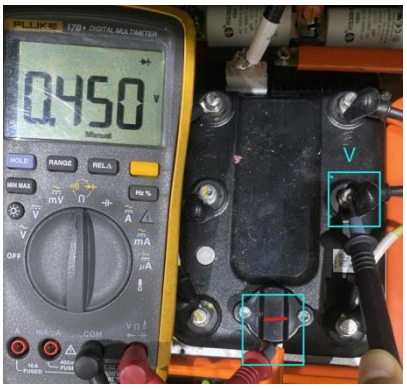
Check:

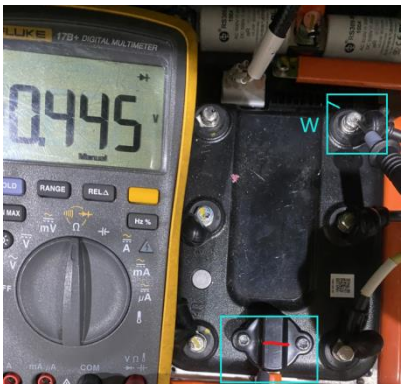
1. Display pop up ML 23/MR 23 fault code.
2. Keep the vehicle power off state.
3. Set the Multimeter to the diode position and measure the voltage between the U \ V \ W phase and the positive electrode.





4. Set the Multimeter to the diode position and measure the voltage between the U \ V \ W phase and the negative electrode.



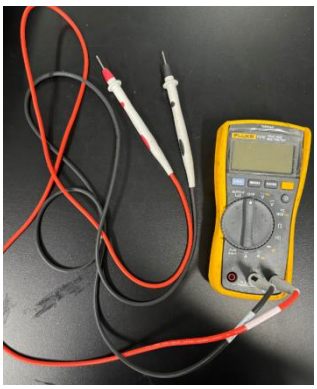


5. If the range is 0.45-0.52V, the MOS is normal. Otherwise, it is judged that the MOS is damaged and the controller needs to be replaced. Refer to the service manual for the specific disassembly and assembly steps.

6. If you have replaced a new controller, remember to follow the self-learning steps for the motor auto-matching test.

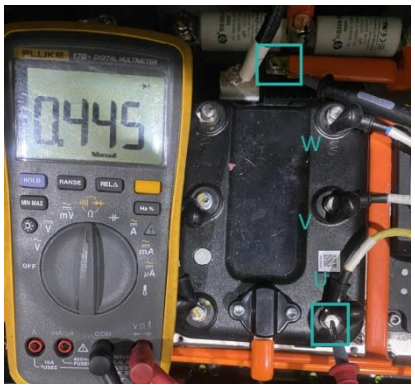
14.46 ML 26/MR 26 Left/Right Blade Motor Controller MOSFET Abnormal

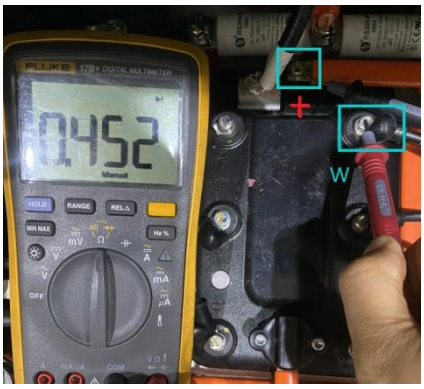
Tool: Multimeter, Computer, Debugging wire, PCAN

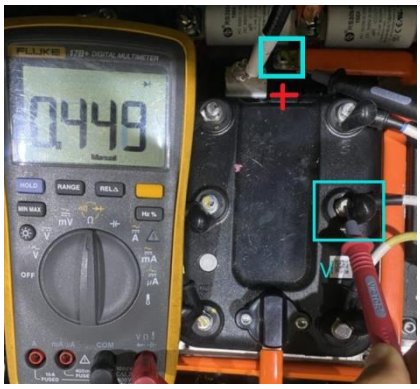


Check:

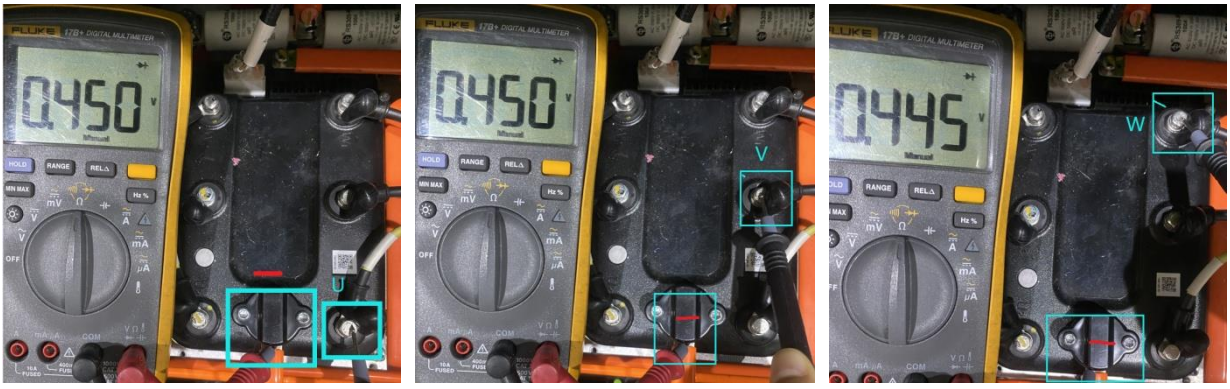
1. Display pop up ML 26/MR 26 fault code.
2. Keep the vehicle power off state.
3. Set the Multimeter to the diode position and measure the voltage between the U \ V \ W phase and the positive electrode.







4. Set the Multimeter to the diode position and measure the voltage between the U \ V \ W phase and the negative electrode.



5. If the range is 4.7-5.0V, the MOS is normal. Otherwise, it is judged that the MOS is damaged and the controller needs to be replaced. Refer to the service manual for the specific disassembly and assembly steps.
6. If you have replaced a new controller, remember to follow the self-learning steps for the motor auto-matching test.

14.47 ML 27/MR 27 Left/Right Left Blade Motor Controller Temperature Sensor Abnormal

Tool: Computer, Debugging wire, PCAN

Check:

1. Display pop up ML 27/MR 27 fault code.
2. Restart Vehicle.
3. If this fault code persists, please replace a new blade controller. Refer to the service manual for the specific disassembly and assembly steps.
4. If you have replaced a new controller, remember to follow the self-learning steps for the motor auto-matching test.

14.48 ML 28/MR 28 Left/Right Blade Motor Controller Self-Check Abnormal

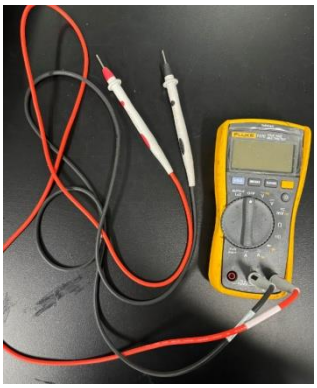
Tool: Computer, Debugging wire, PCAN


Check:

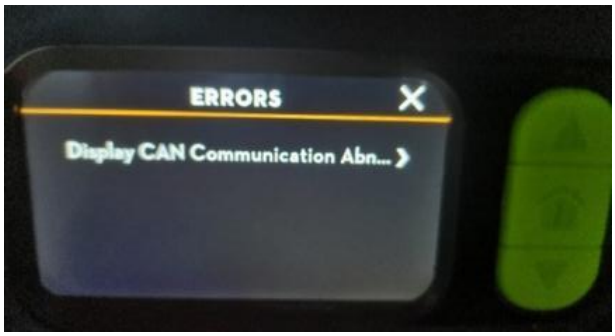
1. Display pop up ML 28/MR 28 fault code.
2. Restart Vehicle.
3. If this fault code persists, please replace a new blade controller. Refer to the service manual for the specific disassembly and assembly steps.
4. If you have replaced a new controller, remember to follow the self-learning steps for the motor auto-matching test.

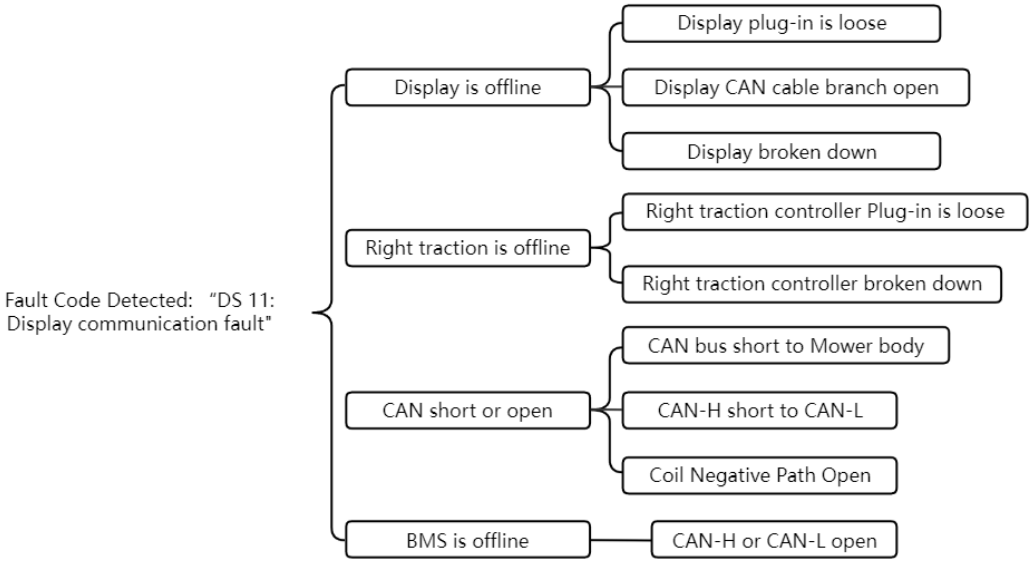
14.49 DS 11 Abnormal Display CAN Communication (First vehicle model)

Tool: Multimeter, Computer, Debugging wire, PCAN



Possible Cause:
This fault means display lose communication with right traction controller. There are seven main reasons that may cause this fault:



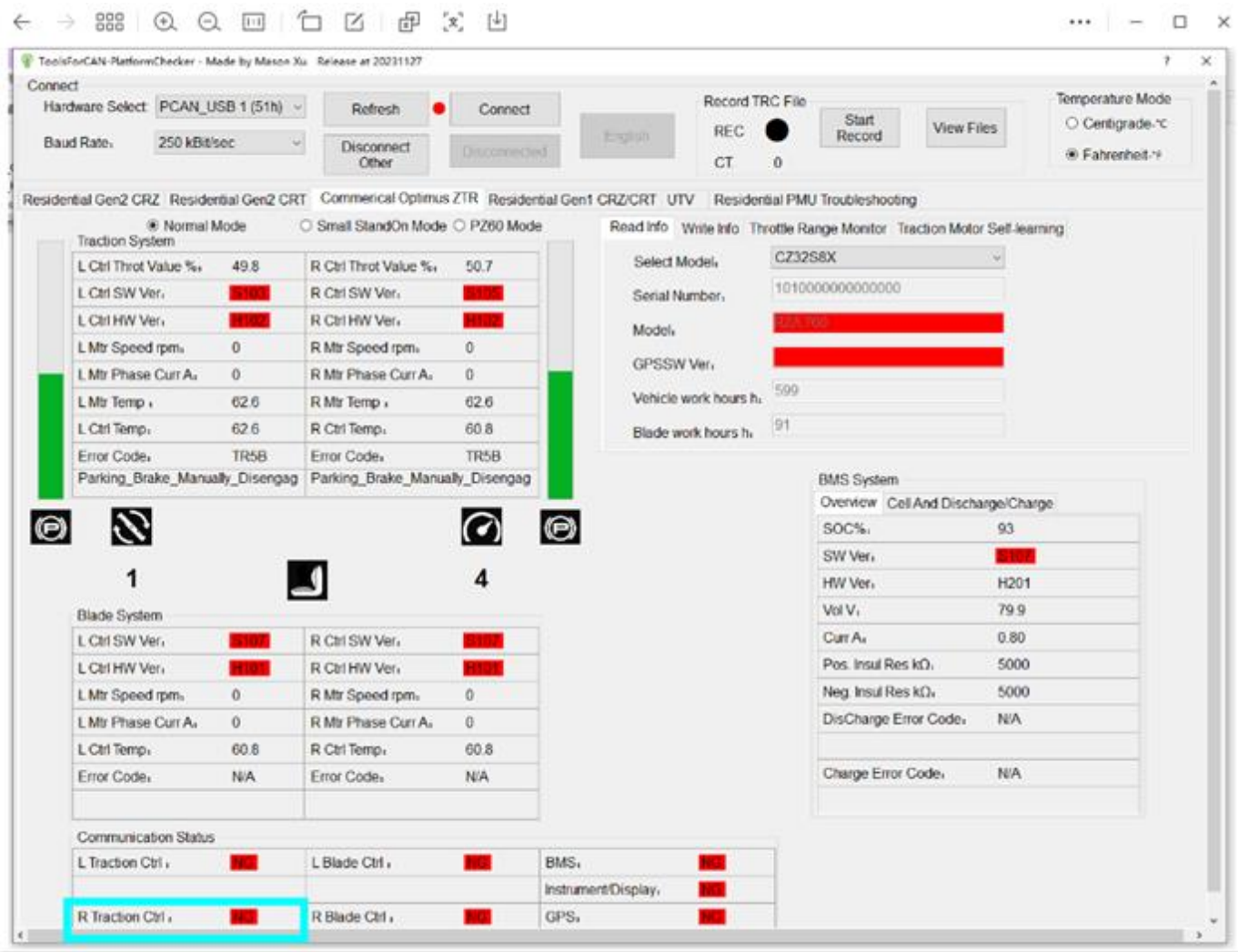


Solution:

1. ToolsForCAN Communication Check.

Connect to the vehicle using P-CAN tool and open software (Tools For CAN-Platform Checker).

Query what components are online or offline (OK-online, NG-offline).



If a component is detected offline, then we can tell the error exist in that component, refer to following steps to inspect and repair. If all components are offline then we have a whole system communication issue.

2. Display is offline check.

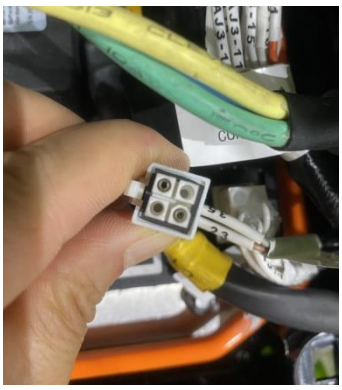
a) Try to normally operate the mower and see if it can move forward or backward normally. If mower can move forward or backward normally, refer to following steps to fix:

b) Check whether the display plug-in is loose. Check if display plug-in CAN-H and CAN-L has pin withdrawing. Check whether there is trash causing poor contact of the plug-in.

c) Use the multimeter to check whether display plug-in CAN-H and CAN-L is well connected. If not, need to replace main wire harness of the vehicle. If yes, need to replace display. (refer to service manual for details).

3. Right controller is offline check.

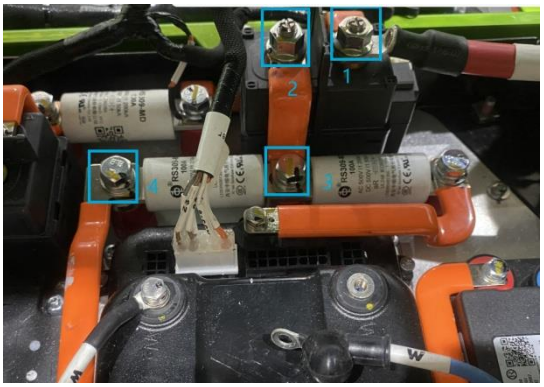
a) Observe main controller indicator light for 20 seconds. If light flashes, then we can tell power supply of the main control is normal. Check whether main controller plug-in is loose. Check if main controller plug-in CAN-H and CAN-L has pin withdrawing. Check whether there is trash causing poor contact of the plug-in.

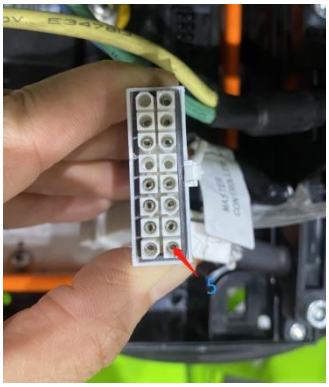


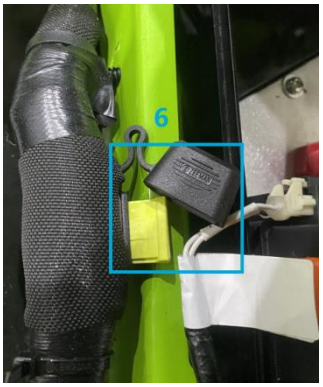
b) If main controller plug-in is normal, use multimeter to check whether CAN-H and CAN-L of display and main controller plug-in is well connected. Check whether there is a circuit break. If not, replace the entire main wire. If light does not flash, then we can tell power supply of the main controller is abnormal. Refer to following steps to inspect and repair:

① Confirm that the bolts at points 1,2,3 and 4 are tightened.

② Then use DC voltage range of multimeter to detect whether the ground voltage in point 1,2 and 4 is above 70V.



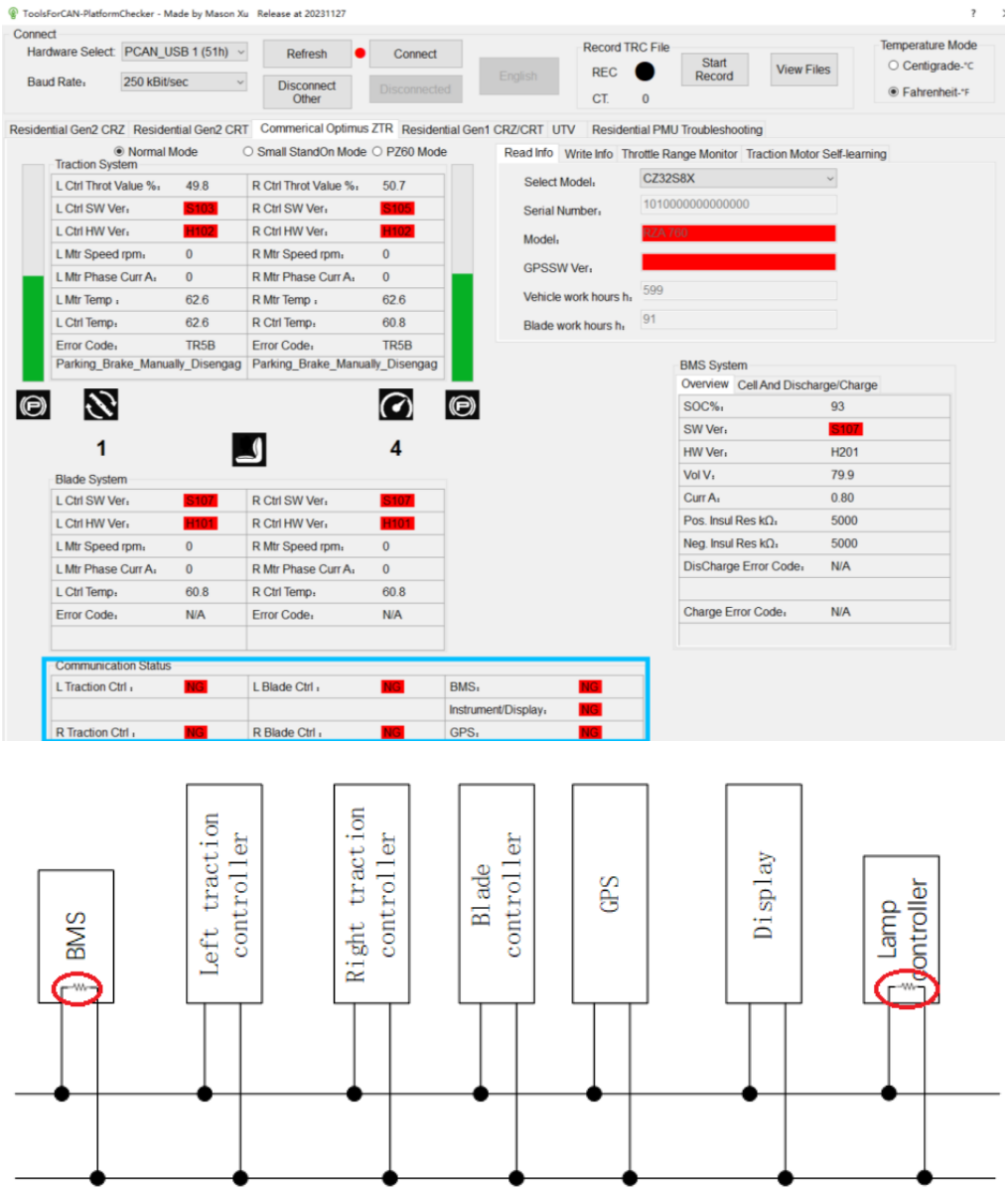




③ If detected voltage at point (1) is under 70V, please overhaul battery pack power supply. (There is issue for the battery high voltage supply). If detected voltage at point (1) is above 70V, while that at point (2) is under 70V, please replace the contactor. If detected voltage at point (3) is above 70V, while that at point (4) is under 70V, please replace the fuse between bolt (3) and (4).

④ If detected ground voltage at point (1), (2), (3), (4) all above 70V, while that at point (5) is under 70V, refer to following steps to inspect and repair: Firstly, check whether the fuse at point (6) is loose, as circled below; If fuse at point (6) is fastened, use multimeter current on/off gear to inspect whether the fused is damaged. Replace if the 20A fuse is damaged; If the fuse is well, please replace main controller wire harness. If detected ground voltage at point (1), (2), (3), (4), (5) all above 70V, the right controller broken down.

4. Open software Tools For CAN-Platform Checker. ToolsForCAN-PlatformChecker If all components show “NG-offline”, then most likely there is a short circuit between CAN-H and CAN-L.



OPTIMUS Z CANBUS NETWORK TOPOLOGY

NOTE: There are two terminal resistances (each of them is 120Ω), one is in BMS, the other one is in lamp controller.

5. CAN bus short or open check.

Always hold multimeter to test the resistance between CAN-H and CAN-L of debugging port, unplug all plug-ins with CAN communication in turn, when you unplug one device such left side light, the resistance turn from around 1.5Ω to around 60 Ω. So as to locate whether there is short circuit between main control wire harness CAN-H and CAN-L, or it's short circuit between certain part's CAN-H and CAN-L.

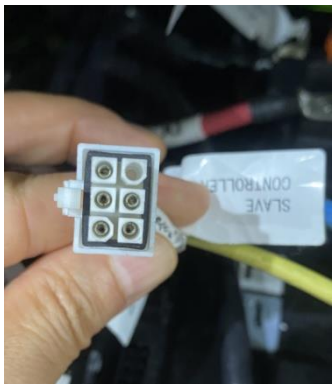
GPS

ETO

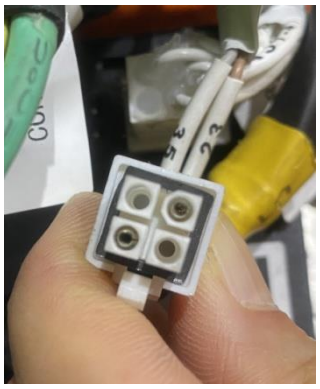
Display

BMS

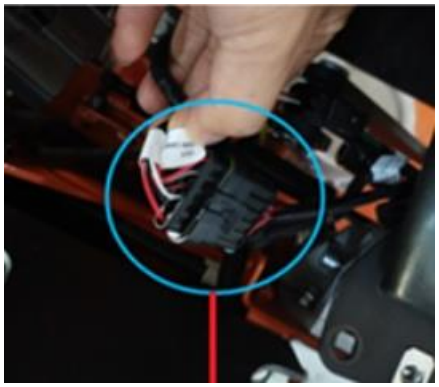
2 in 1 blade controller



Slave controller



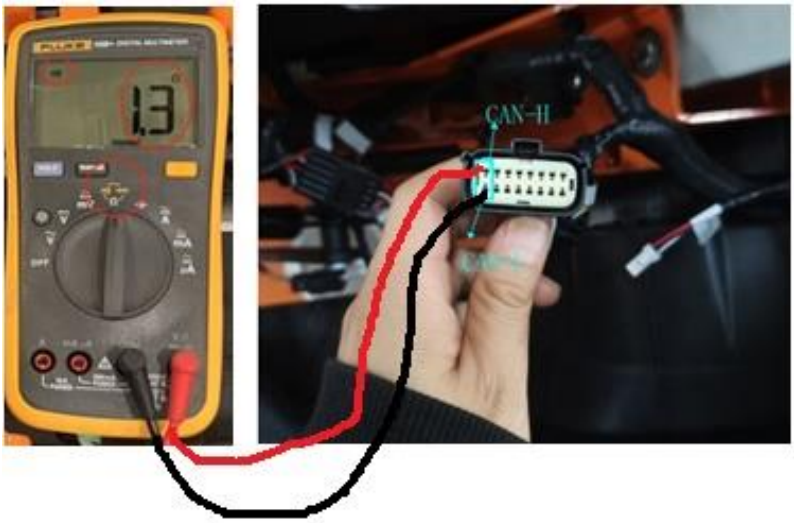
Master controller



Left side light

a) Keep the multimeter to test the resistance value between CAN-H and CAN-L. Then we need to unplug the device connector one by one, at the same time, we need to observe the resistance value.

b) When we first unplug the BMS connector (there is a 120 Ω terminal resistance inside), if the measure resistance turns from around 1.5 Ω to 120 Ω, then we can tell the BMS cause the short. If the measure resistance is about 1.5 Ω, the short still exists.

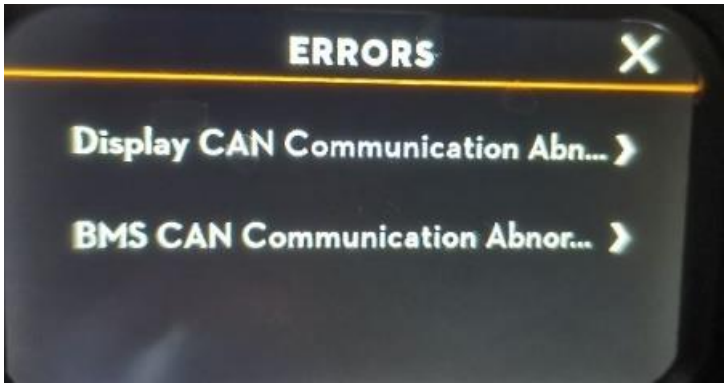


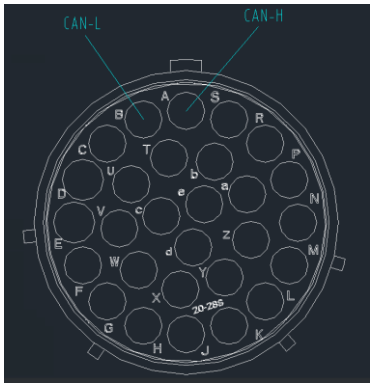
c) Unplug the front lamp plug (lamp controller inside with a 120 Ω terminal resistance), if the measure resistance turns from around1.5 Ω to10k Ω 50k Ω, then we can tell BMS cause the short. When the measure resistance is about 1.5 Ω, the short still exist.

d) Unplug the device connectors one by one, if the measure resistance turns from around1.5 Ω to k Ω, then we can tell the device you just unplug cause the short. When measure resistance is about 1.5 Ω, it means the short still exists, it is harness of the device causes the short between CAN-H and CAN-L.

6. BMS is offline check.

a) Check whether BMS plug-in is loose. Check if BMS plug-in CAN-H and CAN-L has pin withdrawing. Check whether there is trash causing poor contact of the plug-in.

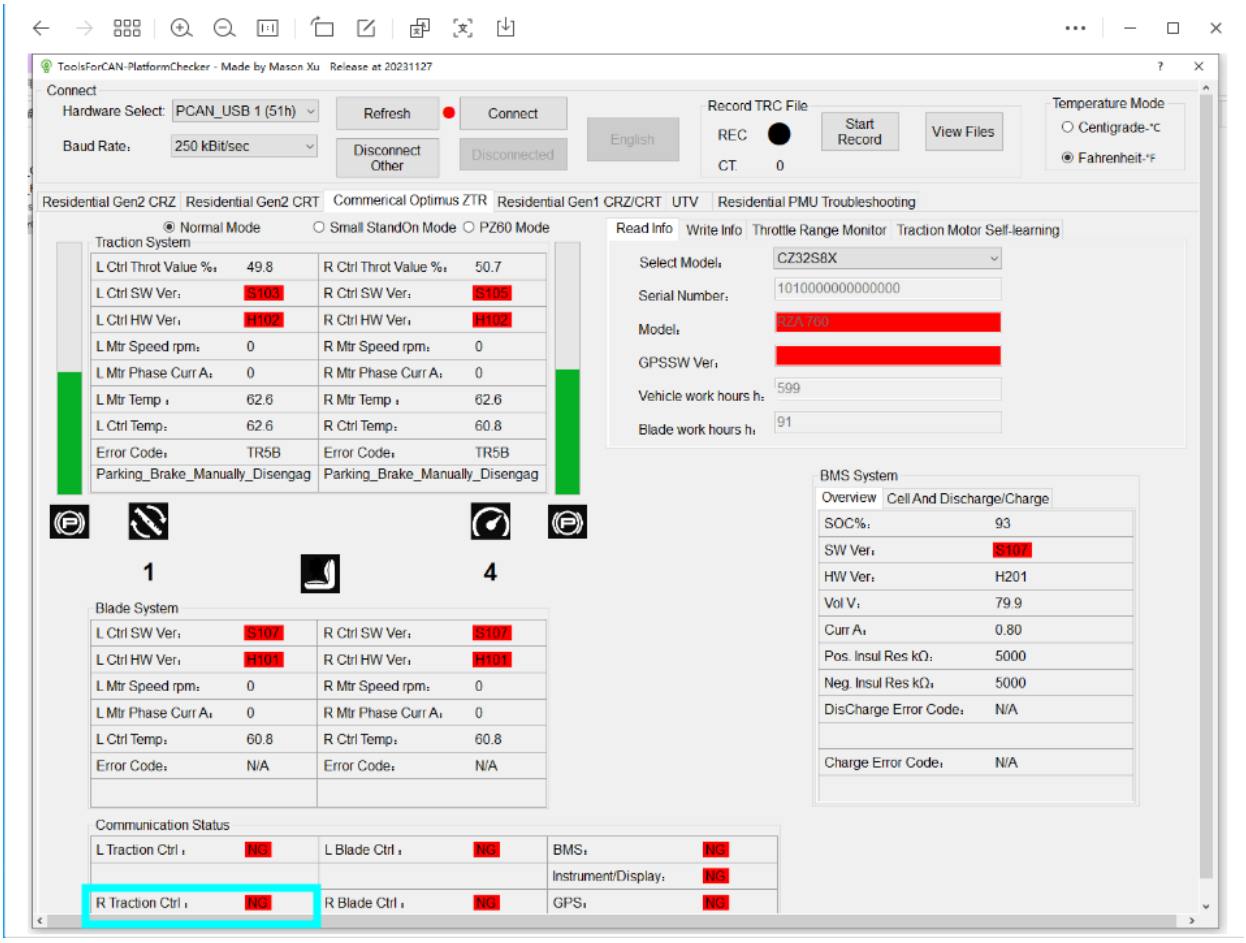




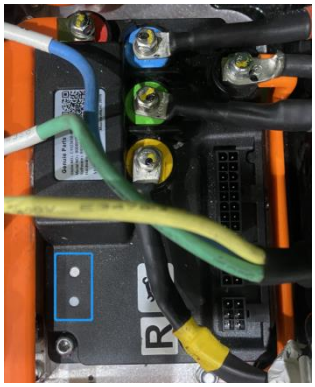
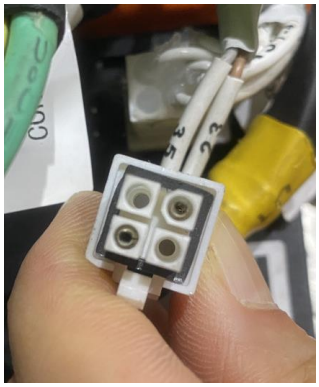
b) Use the multimeter to check whether CAN-H and CAN-L of display plug-in and BMS plug is open. Resistance should measure around 1.3 Ω. If very large value found, then open is detected and wiring harness will need to be replaced.

14.50 DS 12 Right Wheel Controller CAN Communication Abnormal

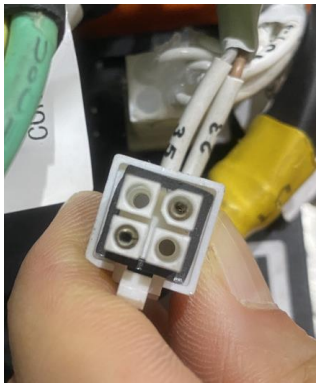
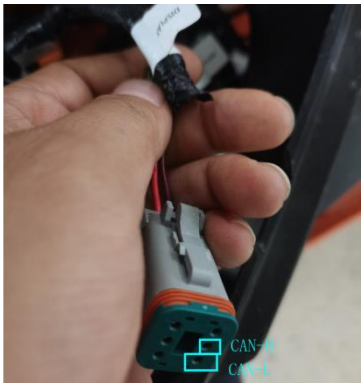
1. If the vehicle cannot move forward or backward normally. ToolsForCAN-PlatformChecker Use P-CAN, open the software, and check whether the main controller is online (displaying "OK" means online; displaying "NG" means offline). If it is not online, it can be determined that the main controller is partially faulty.



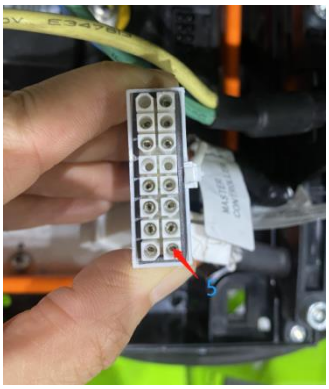
2. Observe the main control indicator light for 20 seconds to see if the indicator light flashes. If the main controller indicator light flashes, it means that the main control power supply is normal. Check whether the main controller plug-in is loose, and check whether the CAN-H and CAN-L pins of the main control plug-in are withdrawn. Check whether there is garbage on the surface of the plug-in, causing poor plug-in contact.

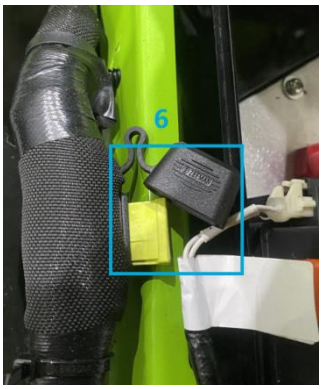



3. If the main control plug-in is normal, use a multimeter to check whether CAN-H and CAN-L of the instrument plug-in and the main control plug-in are connected and whether there is an open circuit. If there is no continuity, replace the vehicle's main wiring harness.

4. If the indicator light of the main controller does not flash, it means that the power supply of the main controller is not normal. First use a wrench to confirm that the bolts (1), (2), (3) and (4) are tightened and there is no sign of looseness. If the bolts are tight, use the DC voltage range of the multimeter to check whether ground voltage at bolts (1), (2) and (4) is above 70V.





5. If the voltage at point (1) is under 70V, the power supply of the battery pack needs to be inspected.

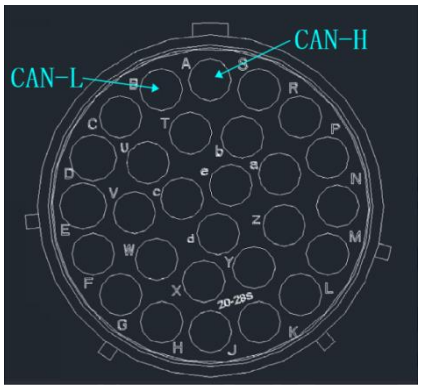
6. If the voltage at point (1) is above 70V, while that at point (2) is under 70V, please replace the contactor. If detected voltage at point (3) is above 70V, while that at point (4) is under 70V, please replace the fuse between bolt (3) and (4).

7. If detected ground voltage at point (1), (2), (3), (4) all above 70V, while that at point (5) is under 70V, refer to following steps to inspect and repair:

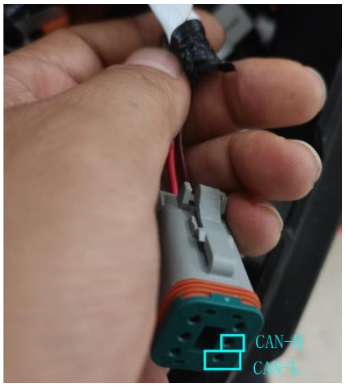
   Firstly, check whether the fuse at point (6) is loose, as circled above; If fuse at point (6) is fastened, use multimeter current on/off gear to inspect whether the fused is damaged. Replace if the 20A fuse is damaged; If the fuse is well, please replace main controller wire harness. If detected ground voltage at point (1), (2), (3), (4), (5) all above 70V, the right controller is broken down.

14.51 DS 13 BMS CAN Communication Abnormal

1. Check whether the BMS plug-in is loose, check whether the BMS plug-in CAN-H and CAN-L pins are withdrawn, and whether there is garbage on the surface of the BMS plug-in, causing poor plug-in contact.



2. If there is no problem with the battery pack plug-in, use a multimeter to check whether the CAN-H and CAN-L of the instrument plug-in and the battery pack plug-in are connected. If there is no continuity, replace the vehicle's main wiring harness.



14.52 BC 11 Input Power Undervoltage

Check:

1. Display pop up BC 11 fault code.
2. Restart charge.
3. Check whether the grid voltage is abnormal.

14.53 BC 12 Input Power Overvoltage

Check:

1. Display pop up BC 12 fault code.
2. Restart charge.
3. Check whether the grid voltage is abnormal.

14.54 BC 13 Output Undervoltage

Check:

1. Display pop up BC 13 fault code.
2. Restart charge.
3. Check whether the load voltage is abnormal.

14.55 BC 14 Output Overvoltage

Check:

1. Display pop up BC 14 fault code.
2. Restart charge.
3. Check whether the load voltage is abnormal.

14.56 BC 15 Output Overcurrent

Check:

1. Display pop up BC 15 fault code.
2. Restart charge.
3. Check whether the charging loop current is abnormal and whether there is output short circuit.

14.57 BC 16 Charger Overtemp

Check:

1. Display pop up BC 16 fault code.
2. When the internal temperature dropped to 69℃ (156 °F), the charger automatically resumed charging.

3. Charger performance reduced while temperature is high. Once temperature is within standard range fault will automatically clear and normal charging operation will resume.

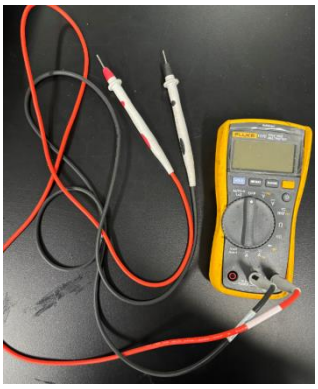
14.58 BC 17 Output Short Circuit

Check:

1. Display pop up BC 17 fault code.
2. Please discontinue charging. Ensure use of a known good charger. If this does not correct the fault, contact dealer for after-sales service.

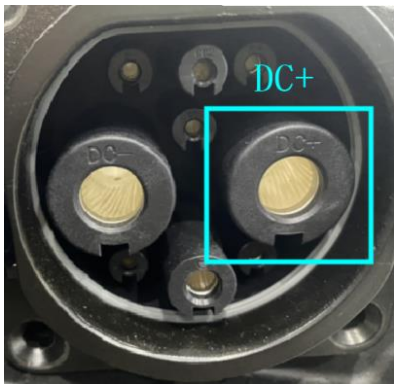
14.59 BC 18 Battery Output Polarity Reversal

Tool: Multimeter

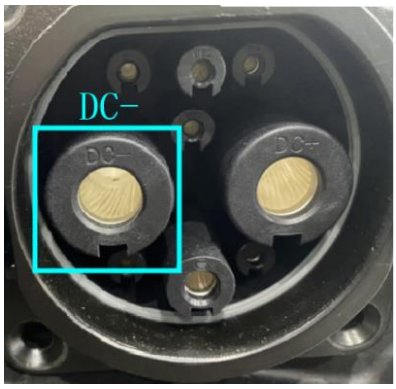


Check:

1. Display pop up BC 18 fault code.
2. Check whether the positive and negative electrodes of the charging socket correspond to the positive and negative electrodes connected to the battery pack.
3. Select the multimeter, remove the C + connector from the battery pack, and measure whether the C + connector and the positive electrode of the charging socket DC + are turned on.



4. Select the multimeter, remove the C-connector from the battery pack, and measure whether the C-connector and the charging socket negative electrode DC can go on.



14.60 BC 19 No Battery Output Voltage

Check:

1. Display pop up BC 19 fault code.
2. Restart the charger, and reinsert charger plug.
3. Check and clear if any debris in charging port or plug. If these actions do not correct the fault, discontinue use of the vehicle and contact dealer for after-sales service.

14.61 BC 21 Non-Load

Check:

1. Display pop up BC 21 fault code.
2. Restart the charger, and reinsert charger plug.
3. Check and clear if any debris in charging port or plug. If these actions do not correct the fault, discontinue use of the vehicle and contact dealer for after-sales service.

14.62 BMS 11 Battery Discharging Slight Overtemp

Check:

1. Display pop up BMS 11 fault code.
2. Vehicle has been put into a state of reduced performance while cooling. Once temperature is back within standard range, the fault will automatically clear and normal operation will resume.

14.63 BMS 12 Battery Discharging Severe Overtemp

Check:

1. Display pop up BMS 12 fault code.
2. Power off.

3. Waiting 30 min.
4. Restart the vehicle.

14.64 BMS 13 Battery Discharging Slight Undertemp

Check:

1. Display pop up BMS 13 fault code.
2. Vehicle has been put into a state of reduced performance while cooling. Once temperature is back within standard range, the fault will automatically clear and normal operation will resume.

14.65 BMS 14 Battery Discharging Severe Undertemp

Check:

1. Display pop up BMS 14 fault code.
2. Power on.
3. Waiting 30 min.
4. Restart the vehicle.

14.66 BMS 15 Battery Cells Slight Temperature Difference

1. Display pop up BMS 15 fault code.
2. Vehicle has been put into a state of reduced performance while cell temperatures return to normal. Once temperature is back within standard range, the fault will automatically clear and normal operation will resume.

14.67 BMS 16 Battery Cells Severe Temperature Difference

Check:

1. Display pop up BMS 16 fault code.
2. Power off.
3. Waiting 6 hours.
4. Restart the vehicle.

14.68 BMS 17 Battery Cells Slight Overvoltage

Check:

1. Display pop up BMS 17 fault code.
2. Stop charging.
3. Normal driving.

14.69 BMS 18 Battery Cells Severe Overvoltage

Check:

1. Display pop up BMS 18 fault code.
2. Stop charging.
3. Restart the vehicle.
4. Normal driving.

14.70 BMS 19 Battery Cells Slight Undervoltage

Check:

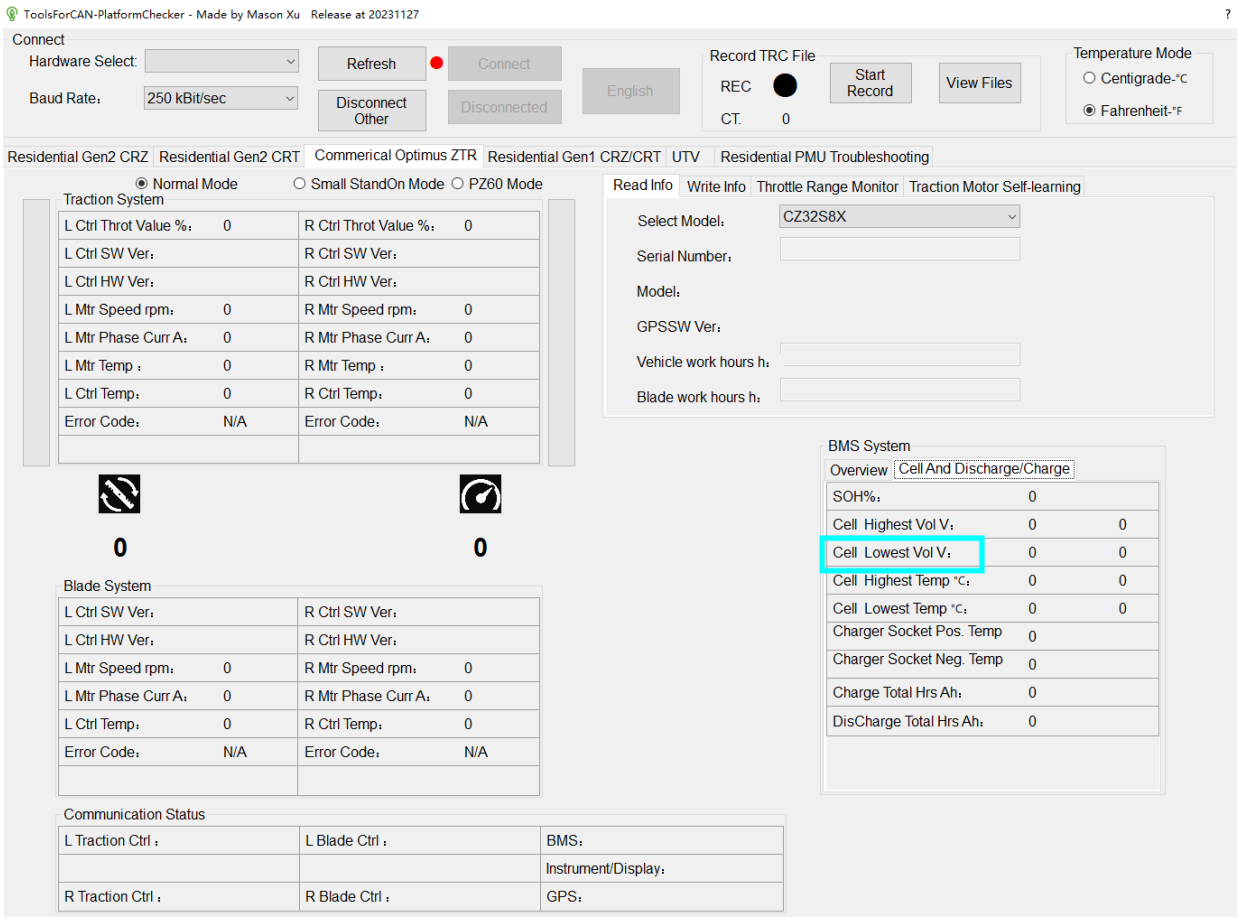
1. Display pop up BMS 19 fault code.
2. Reduce load.
3. Charging.

14.71 BMS 21 Battery Cells Severe Undervoltage

Tool: Computer, Debugging wire, PCAN, Charger

Check:

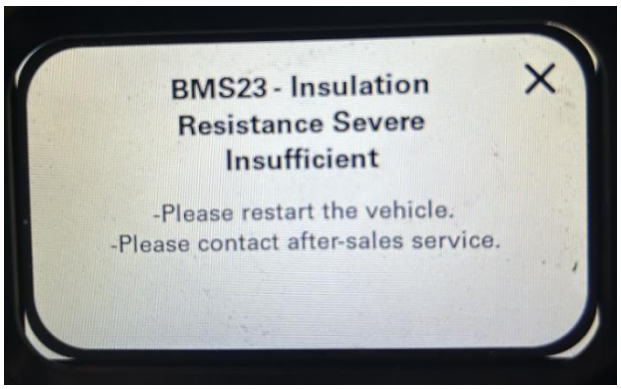
1. Display pop up BMS 21 fault code.
2. Connect to host computer to view computer interface.



3. If cell lowest voltage is under 1.8V, replace the battery pack.
4. If Battery Cells Voltage Difference less than 1.5V, Update BMS maintenance program, if start charging, minimum cell voltage is charged to 3V or maximum cell voltage to 3.6V cutoff and update program.
5. If Battery Cells Voltage Difference less than 600mv, charge normally to 100%SOC. If Battery Cells Voltage Difference greater than 600mv, you need to replace the battery pack.
6. If Battery Cells Voltage Difference greater than 1.5V, Replace the battery pack.
7. 2V < cell lowest voltage < 2.5V, Shielded battery voltage difference fault, normal charge.
8. 2.5V < cell lowest voltage, Battery Cells Voltage Difference greater than 600mv, replace the battery pack.

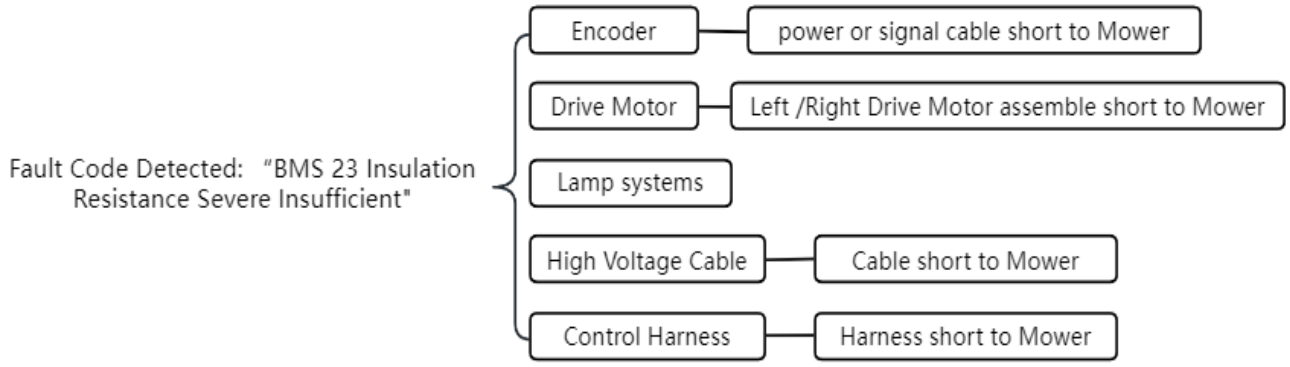
14.72 BMS 23 Insulation Resistance Severe Insufficient

Tool: Insulation resistance meter



Possible Cause:

This error occurs when the vehicles BMS system has detected a severe insulation error.



Solution:

1. Encoder check.

When BMS 23 error appears, we need to check whether left encoder or right encoder cause the BMS23 error.

a) First power off the Mower.

b) Then disconnect then left encoder.

c) Finally, power on the machine. If the error code disappears, then the left encoder is causing BMS 23. If the BMS 23 error is still present, plug in the left encoder and then repeat the above 3 steps for the right encoder. If the error disappears, it is the right encoder that causing BMS 23.

d) If fault still exists, repeat the above 3 steps with both encoders disconnected. If BMS 23 disappears, both encoders are faulty.

2. Drive motor check.

Now we will measure if the right or left motor is causing BMS23.

a) Disconnect the motor three-phase wire.

b) Measure the resistance of the three-phase line to the ground respectively. If the measured value is OL or mega ohms, there is no problem. If less than this value, the motor is short circuit to the ground.

3. Lamp check.

Measure whether it is the lamps causing BMS23 error (different mowers have different lamps, but the method remains the same).

a) When there is a BMS23 error code, first switch off the unit.

b) Keep one of the lamp connectors unconnected.

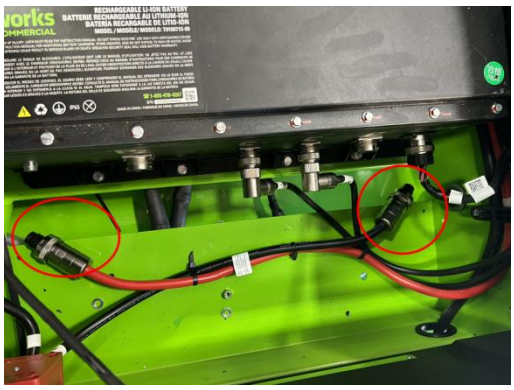
c) Power on the unit, if BMS23 disappears, it means the lamp you just unplug cause the error.

d) If the error still exists, then move to the next lamp and repeat the previous 3 steps. If the error disappears during this process, then the last lamp you unplugged is faulty. If all lamps have been unplugged and error still exists, the lamps are not the cause of the error.

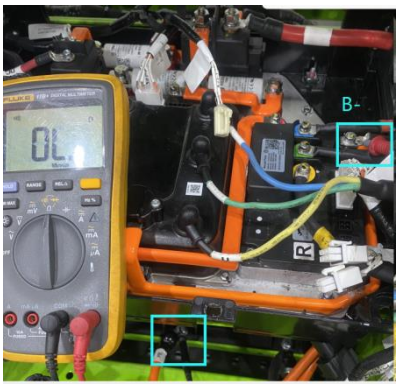
NOTE: Each time before you unplug the lamp connector, you need to first power cycle the unit.

4. Battery Positive and Negative Cable Check.

a) Disconnect both ends of the high voltage battery cable. (one end at the battery, and the other at controller panel).



b) Now measure the resistance of each cable to chassis ground. If the measured value is OL or Mega ohms then no ground short found. If the value is below this then a ground short has been found.



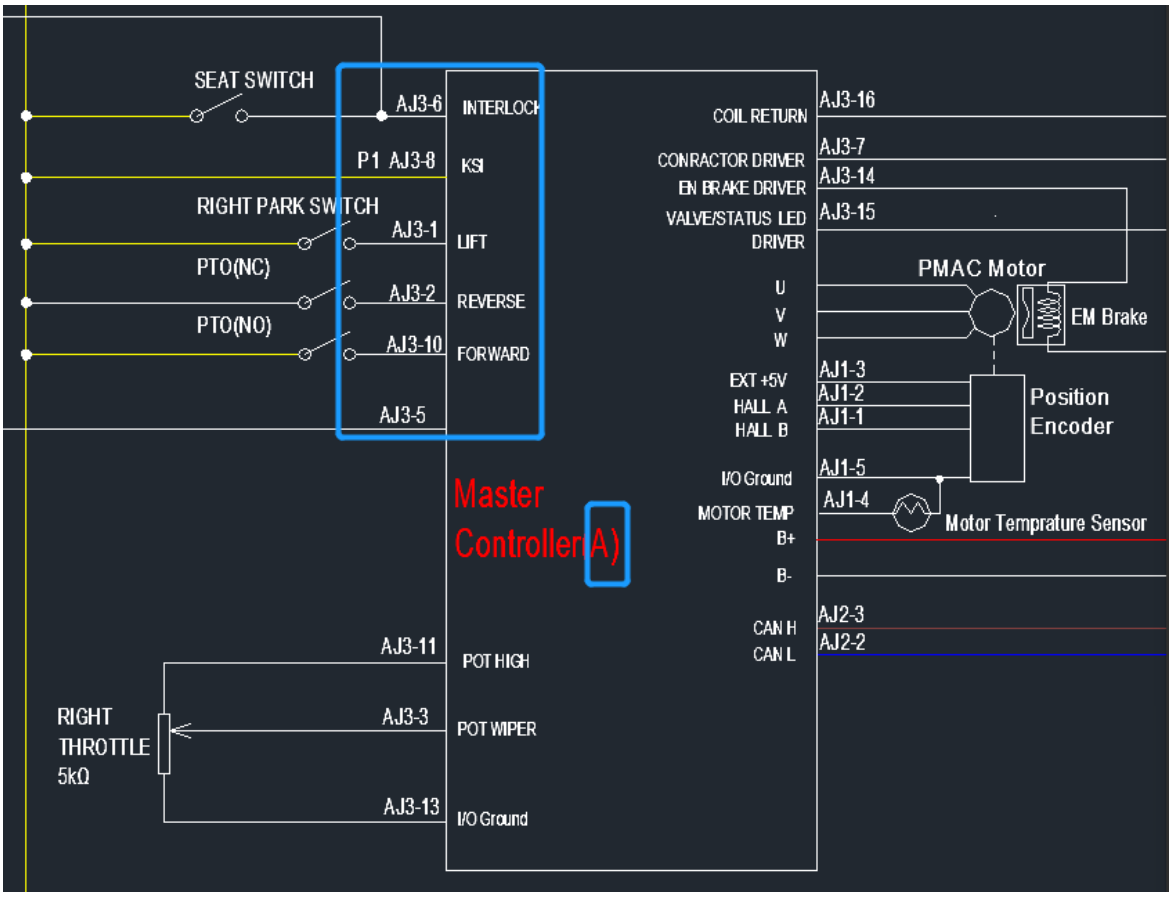
5. Battery system check.

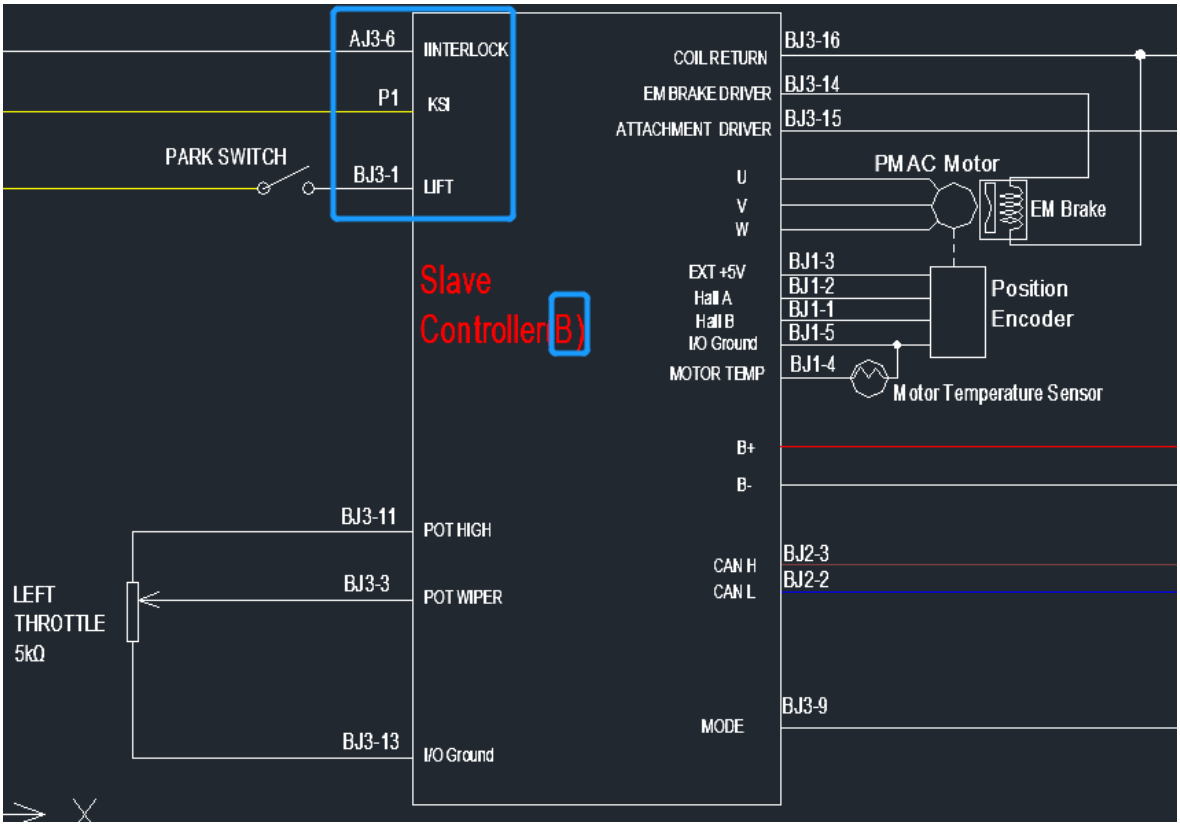
a) If battery positive and negative cable is OK. Plug the Battery Positive and Negative connector into battery.

b) With the cables connected at the battery measure the resistance. From the other end of each battery cable to chassis ground. If the measured value is OL or in the Mega ohms then no ground short found. If the value is below this then a ground short has been found.

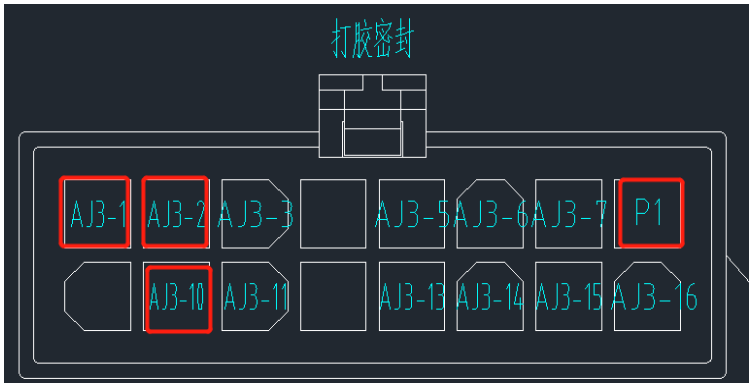
6. Control Harness check

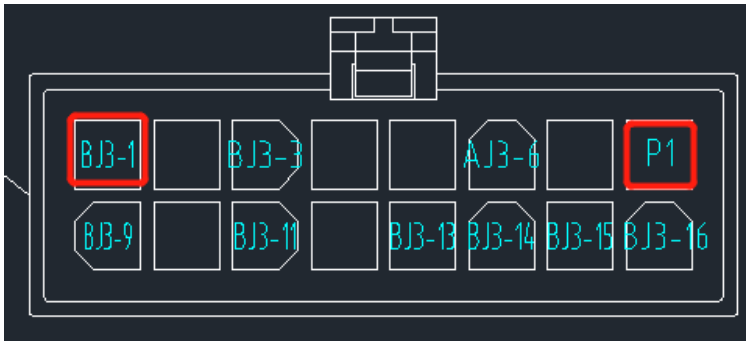
a) If high voltage cable short to chassis ground, BMS23 will occur. As you see in the following drawings, the red line A, B lines are all High voltage(80V), when these cables short to ground, BMS23 occurs.



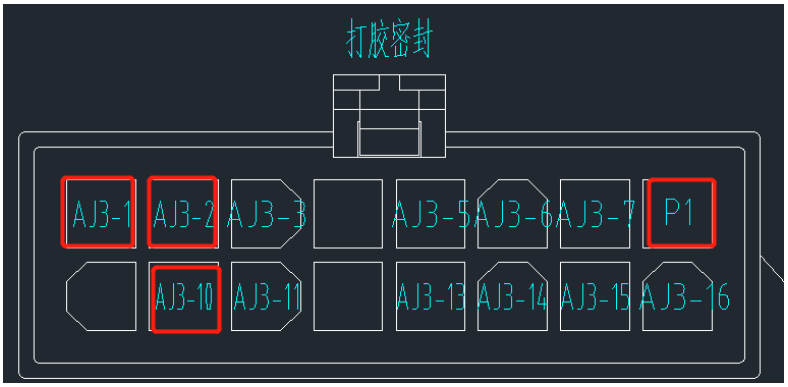


b) Power off the vehicle, unplug right and left traction controller connector. Right control lever and left control lever release to parking position. Press the PTO switch (AJ3-2 is a normally close switch). Measure the resistance value between pin AJ3-2 and Mower ground. Measure the AJ3-1 /BJ3-1 by the same way.

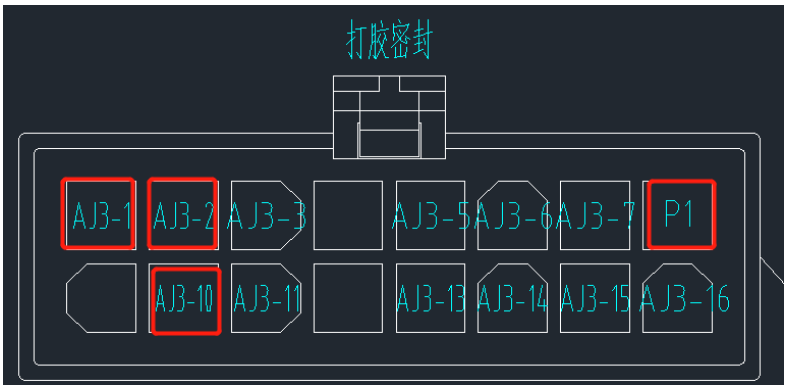




c) Using previous method, measure AJ1-10. Keep unit powered off. Pull PTO switch (AJ3-10 is a normally open switch). Put right control lever and left control lever to parking position. Measure the resistance value between pin AJ3-10 and Mower ground. If the measured value is OL or in the Mega ohms, then no ground short found. If measured value is under this then a ground short has been found, and the control harness will need replacing.



d) Measure resistance value between P1 and mower ground by following the above measuring method. Keep unit powered off. Directly measure the resistance value between P1 and chassis ground. If the measured value is OL or in the Mega ohms then no ground short found. If the value is below this then a ground short has been found and the control harness will need replacing.



14.73 BMS 24 Battery Discharge Slight Overcurrent

Check:

1. Display pop up BMS 24 fault code.
2. Reduce load.

14.74 BMS 25 Battery Discharge Severe Overcurrent

Check:

1. Display pop up BMS 25 fault code.
2. Reduce load.

3. Restart the vehicle.

14.75 BMS 26 Battery Cells Voltage Slight Difference

Check:

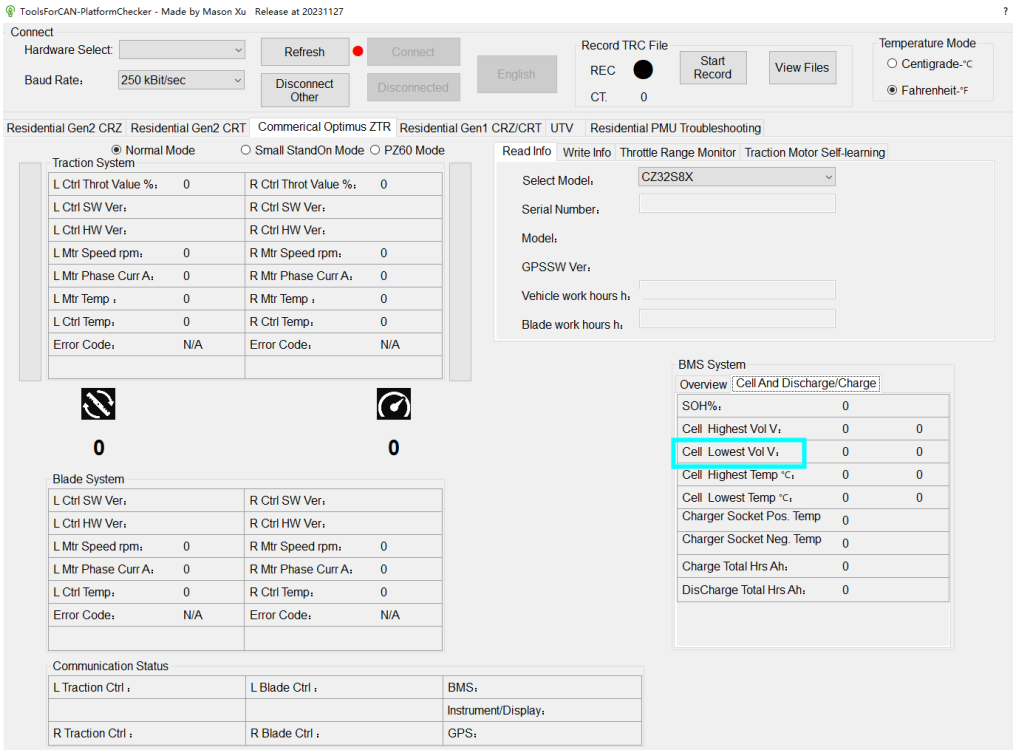
1. Display pop up BMS 26 fault code.
2. Reduce load.
3. Charging.

14.76 BMS 27 Battery Cells Voltage Severe Difference

Tool: Computer, Debugging wire, PCAN, Charger

Check:

1. Display pop up BMS 27 fault code.
2. Connect to host computer View computer interface.



3. If cell lowest voltage < 1.8V，Replace the battery pack.
4. If Battery Cells Voltage Difference less than 1.5V, Update BMS maintenance program, Start Charging, Minimum cell voltage is charged to 3V cutoff. Update normal program, Battery Cells Voltage Difference less than 600mv, charge normally to 100%SOC. Battery Cells Voltage Difference greater than 600mv, Replace the battery pack.
5. If Battery Cells Voltage Difference greater than1.5V, Replace the battery pack.
6. If 2V < cell lowest voltage < 2.5V, Shielded battery voltage difference fault, normal charge.
7. If 2.5V < cell lowest voltage, Battery Cells Voltage Difference greater than 600mv, replace the battery pack.

14.77 BMS 28 Battery Slight Overvoltage

Check:

1. Display pop up BMS 28 fault code.
2. Stop charging.
3. Normal driving.

14.78 BMS 29 Battery Severe Overvoltage

Check:

1. Display pop up BMS 29 fault code.
2. Stop charging.

3. Restart the vehicle.
4. Normal driving.

14.79 BMS 31 Battery Slight Undervoltage

Check:

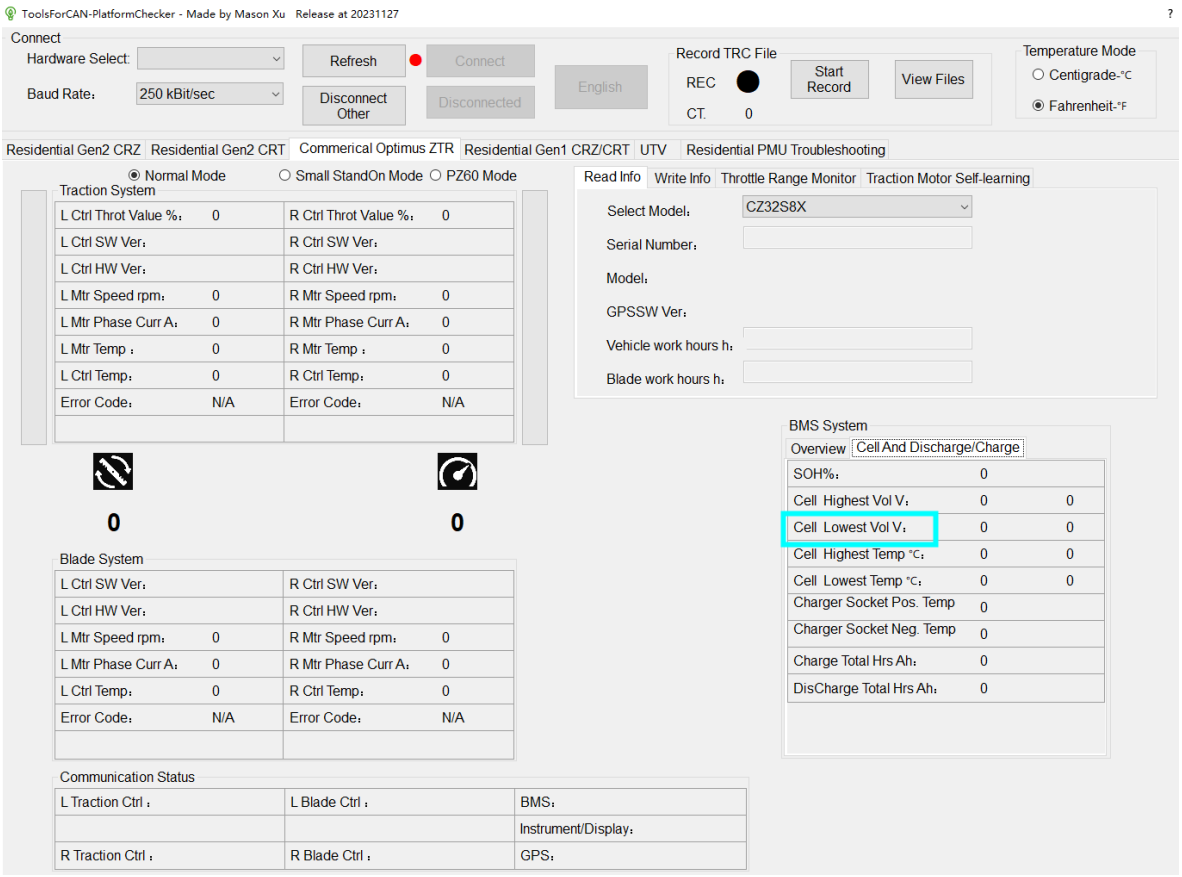
1. Display pop up BMS 31 fault code.
2. Reduce load.
3. Charging.

14.80 BMS 32 Battery Severe Undervoltage

Tool: Computer, Debugging Wire, PCAN, Charger

Check:

1. Display pop up BMS 32 fault code.
2. Connect to host computer View computer interface.



3. If cell lowest voltage < 1.8V，Replace the battery pack.
4. If Battery Cells Voltage Difference less than 1.5V, Update BMS maintenance program, Start Charging, Minimum cell voltage is charged to 3V cutoff. Update normal program, Battery Cells Voltage Difference less than 600mv, charge normally to 100%SOC. Battery Cells Voltage Difference greater than 600mv, Replace the battery pack.
5. If Battery Cells Voltage Difference greater than1.5V, Replace the battery pack.
6. If 2V < cell lowest voltage < 2.5V, Shielded battery voltage difference fault, normal charge.
7. If 2.5V < cell lowest voltage, Battery Cells Voltage Difference greater than 600mv, replace the battery pack.

14.81 BMS 33 Battery Charging Slight Overtempt

Check:

1. Display pop up BMS 33 fault code.
2. Request half the current limit.
3. The charger output current drops by half.
4. Temperature is within standard range fault will automatically clear and normal charging operation will resume.

14.82 BMS 34 Battery Charging Severe Overtempt

Check:

1. Display pop up BMS 34 fault code.
2. Stop Charging.
3. Waiting the unit to cool down.
4. Recharge.

14.83 BMS 35 Charging Port Slight Overtemp

Check:

1. Display pop up BMS 35 fault code.
2. Request half the current limit.
3. The charger output current drops by half.
4. Temperature is within standard range fault will automatically clear and normal charging operation will resume.

14.84 BMS 36 Charging Port Severe Overtemp

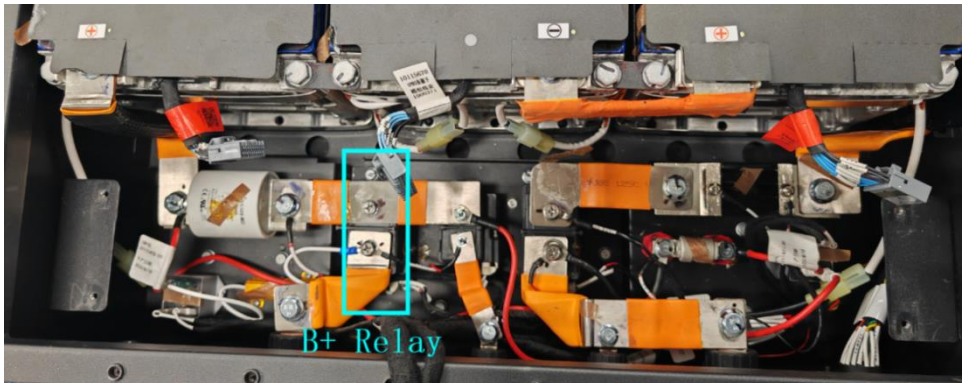
Check:

1. Display pop up BMS 36 fault code.
2. Stop Charging.
3. Waiting the unit to cool down.
4. Recharge.

14.85 BMS 37 Discharging B+ Contactor Welded

Check:

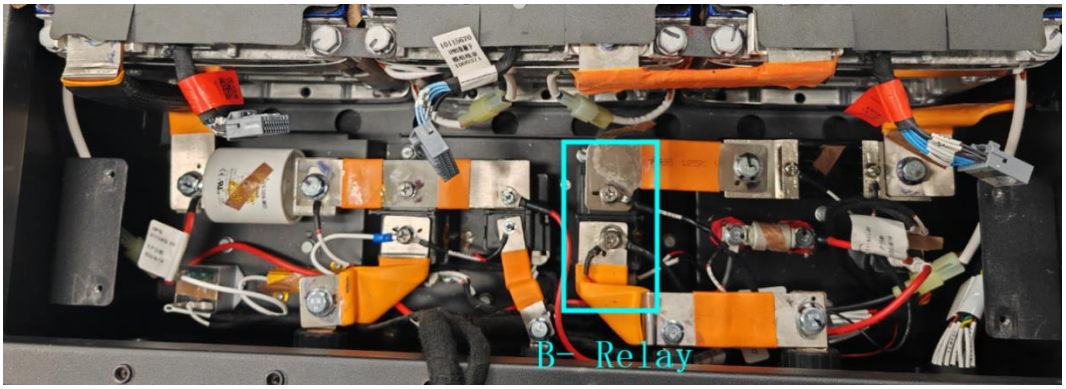
1. Display pop up BMS 37 fault code.
2. Discontinue Use if restart doesn't fix.
3. Remove the battery box cover Replace the battery pack discharge B+ relay.



14.86 BMS 38 Discharging B- Contactor Welded

Check:

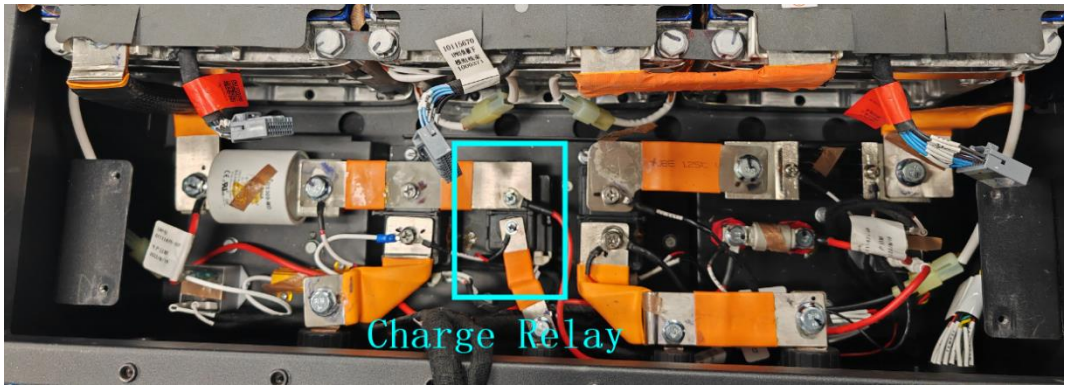
1. Display pop up BMS 38 fault code.
2. Discontinue use if restart doesn't fix.
3. Remove the battery box cover. Replace the battery pack discharge B- relay.



14.87 BMS 39 Battery Charging Contactor Welded

Check:

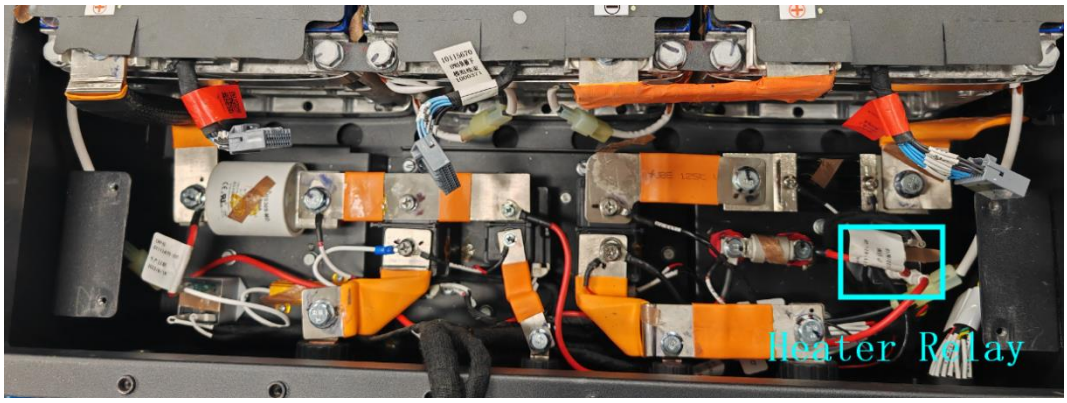
1. Display pop up BMS 39 fault code.
2. Discontinue Use if restart doesn't fix.
3. Remove the battery box cover Replace the battery pack charge relay.



14.88 BMS 41 Battery Heater Contactor Welded

Check:

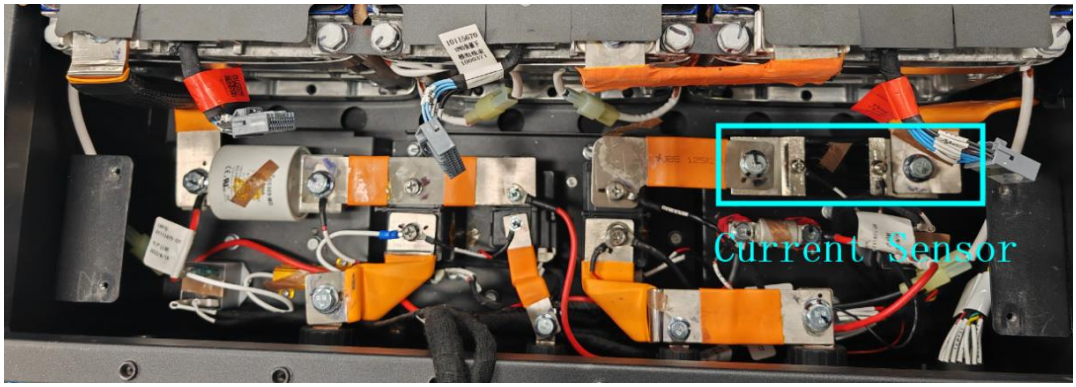
1. Display pop up BMS 41 fault code.
2. Discontinue Use if restart doesn't fix.
3. Remove the battery box cover Replace the battery pack heater relay.



14.89 BMS 42 Battery Current Sensor Abnormal

Check:

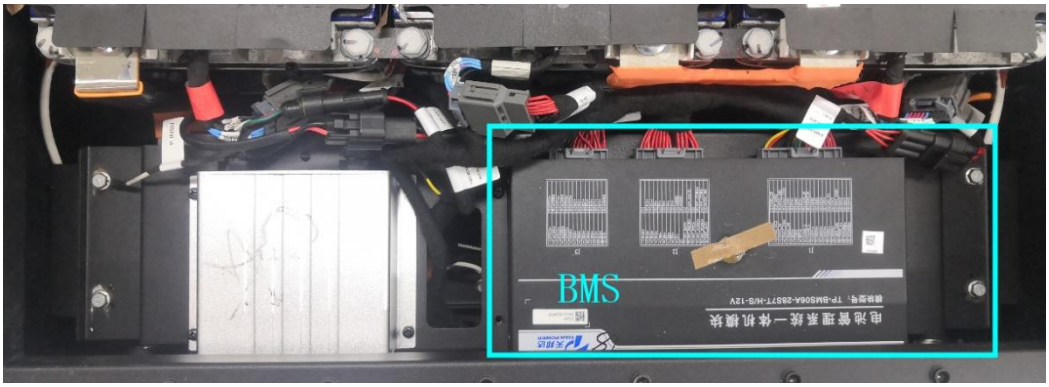
1. Display pop up BMS 42 fault code.
2. Discontinue Use if restart doesn't fix.
3. Remove the battery box cover. Replace the battery pack Current Sensor.



14.90 BMS 43 Battery Sampling Chip Abnormal

Check:

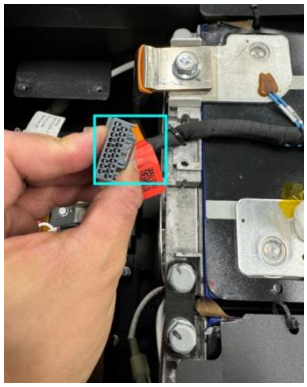
1. Display pop up BMS 43 fault code.
2. Discontinue Use if restart doesn't fix.
3. Remove the battery box cover Replace the battery pack BMS.



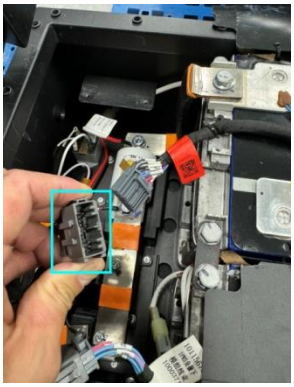
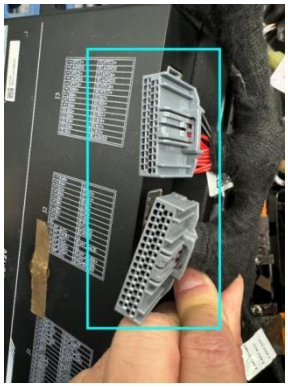
14.91 BMS 44 Battery Cell Open Circuit

Check:

1. Display pop up BMS 44 fault code.
2. Discontinue Use if restart doesn't fix.
3. Remove the battery box cove Check whether the cable on the module is disconnected, no disconnected.



4. Check whether the module connector is burned black.
5. Check whether the BMS module connector is burned black.

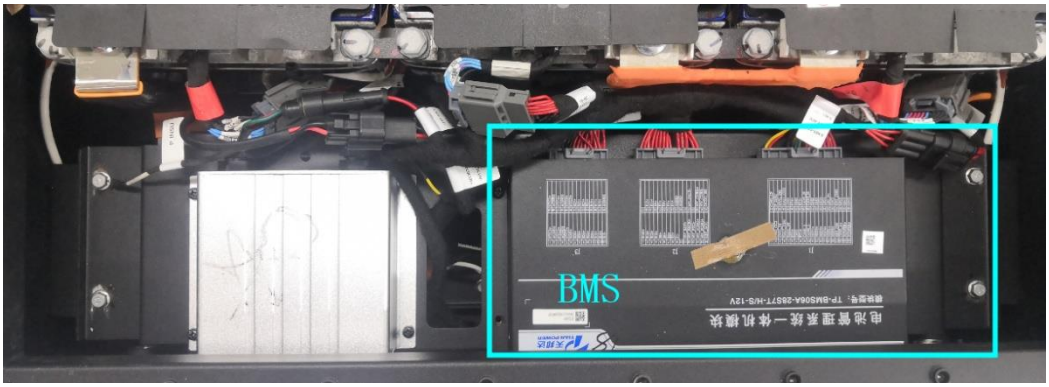



6. Check whether the BMS connector is burned black, if no burned black, BMS damage, Replace the battery pack BMS.

14.92 BMS 45 Master and Slave chips Abnormal

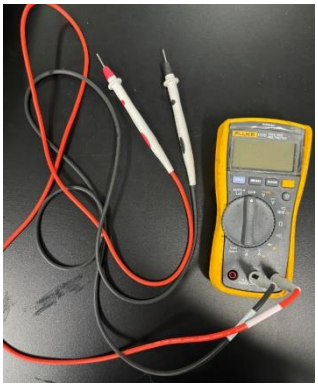
Check:

1. Display pop up BMS 45 fault code.
2. Discontinue Use if restart doesn't fix.
3. Remove the battery box cover Replace the battery pack BMS.



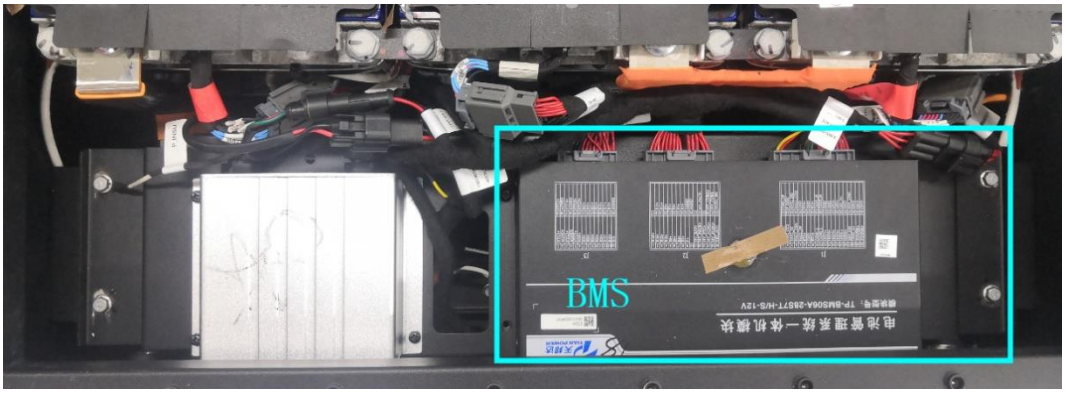
14.93 BMS 47 Charger CAN Communication Timeout

Tool: Multimeter



Check:

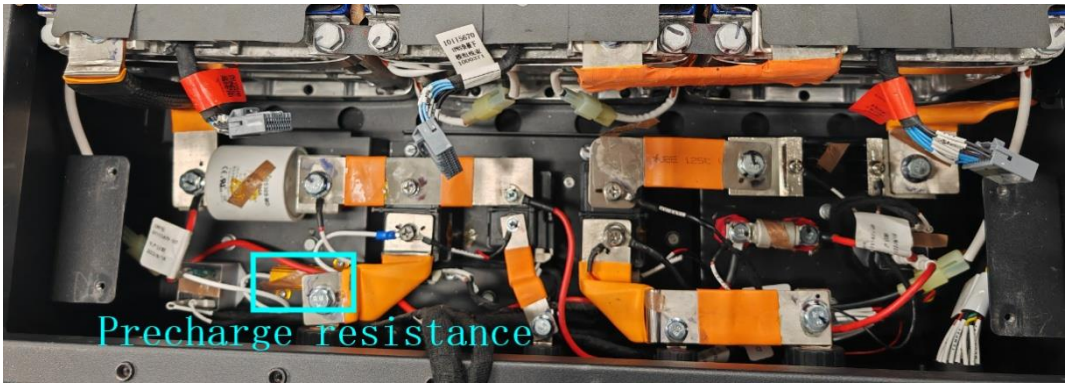
1. Display pop up BMS 47 fault code.
2. Set the multimeter to resistance, Check whether the CAN between the battery communication port and the charging base is properly connected. If Displays 0Ω，Replace the charge.
3. If Battery cannot be charged, Remove the battery box cover, Replace the BMS.



14.94 BMS 48 Battery Precharge Failed

Check:

1. Display pop up BMS 48 fault code.
2. Discontinue Use if restart doesn't fix.
3. Remove the battery box cover Replace the battery pack precharge resistance.



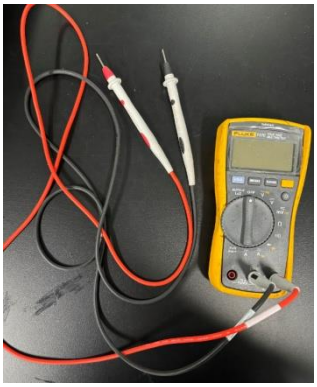
14.95 BMS 49 Battery 12V Abnormal

Check:

1. Display pop up BMS 49 fault code.
2. Discontinue Use if restart doesn't fix.
3. Remove the battery box cover Replace the battery pack DC/DC power.

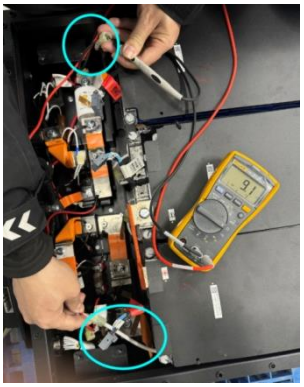
14.96 BMS 51 Battery Heater Abnormal

Tool: Multimeter

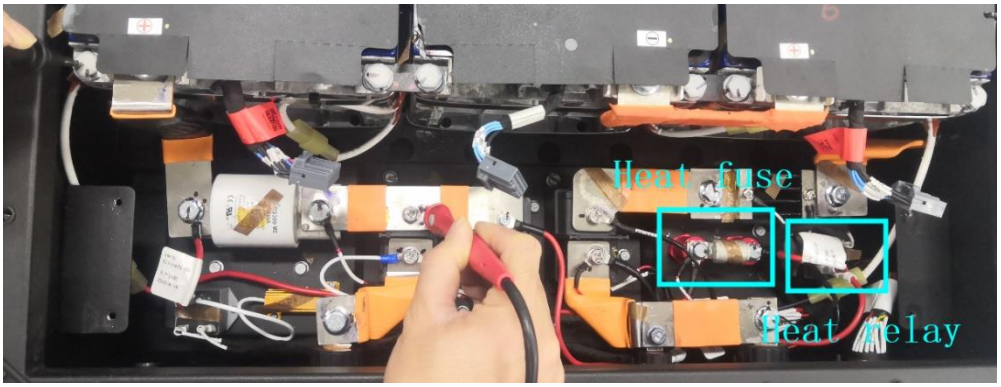


Check:

1. Display pop up BMS 51 fault code.
2. Check the resistance of the battery heating film, the normal range is 9 to 11. if no, heating film damage.

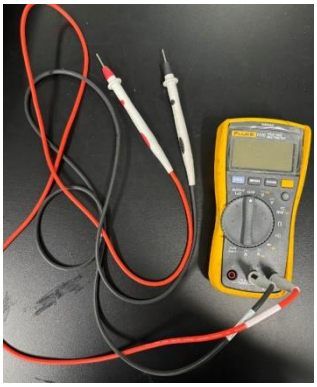


3. Check heat relay and heat fuse, Heating relay and heating fuse intact, Replace the battery pack BMS.



14.97 BMS 52 Battery CC2 Detection Abnormal

Tool: Multimeter

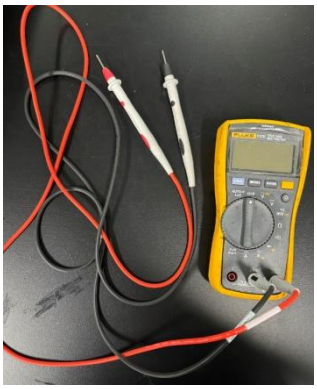


Check:

1. Display pop up BMS 52 fault code.
2. Check that the grounding cable on the charging base is properly connected to the frame If no 0 is displayed, reconnect the ground cable.

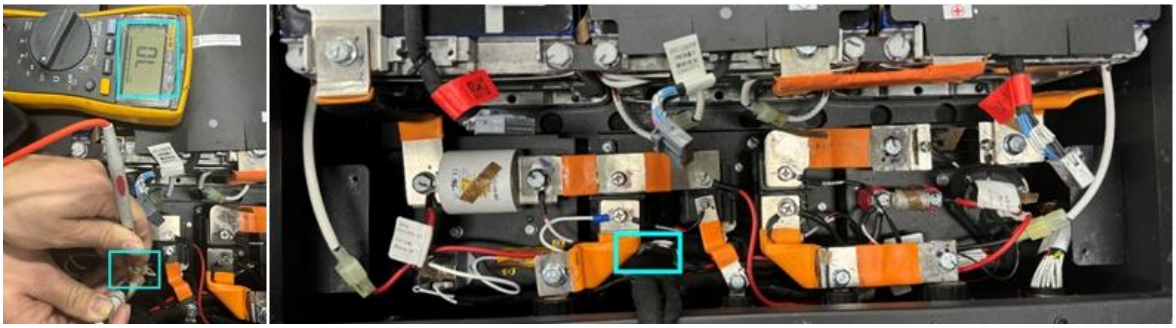
14.98 BMS 53 Battery B+ Contactor Coil Short

Tool: Multimeter



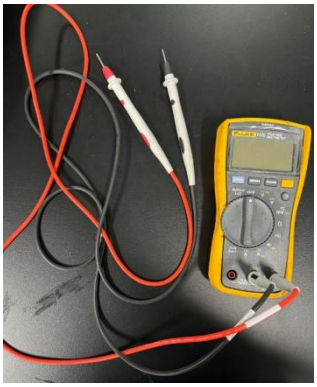
Check:

1. Display pop up BMS 53 fault code.
2. Check the coil of the B+ relay, OL not shown, relay damage, Replace B+ relay.



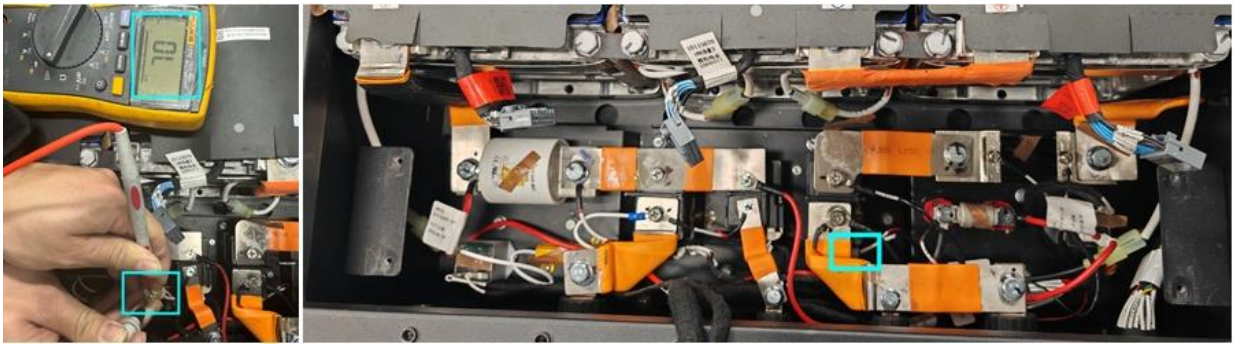
14.99 BMS 54 Battery B- Contactor Coil Short

Tool: Multimeter



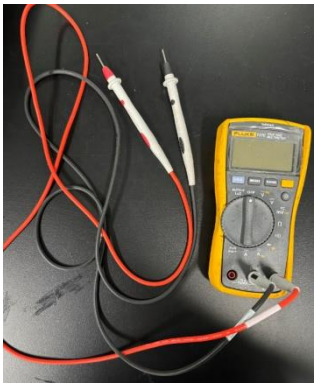
Check:

1. Display pop up BMS 54 fault code.
2. Check the coil of the B- relay, OL not shown, relay damage, Replace B- relay.



14.100 BMS 55 Battery Pre-charge Contactor Coil Short

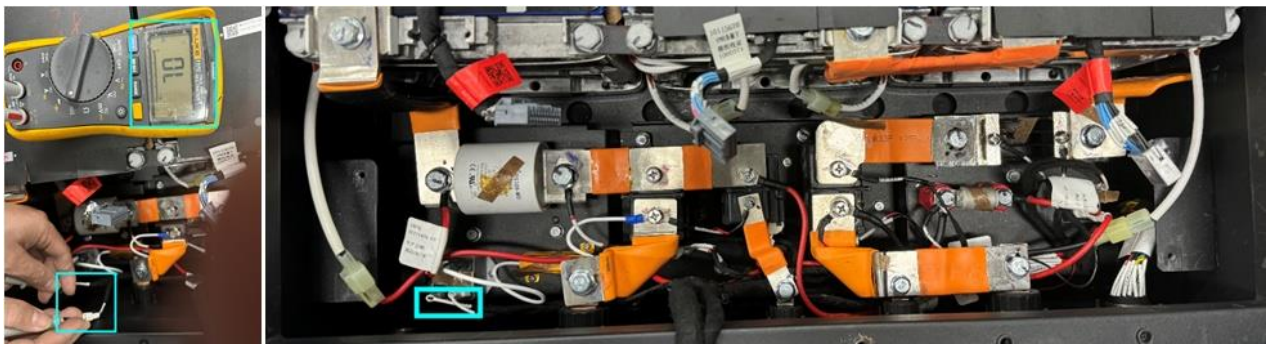
Tool: multimeter



Check:

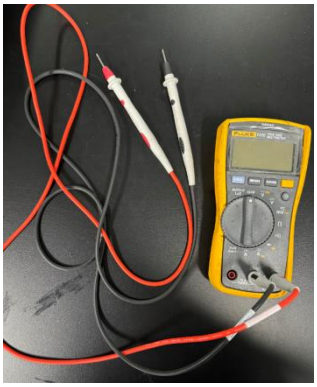
1. Display pop up BMS 55 fault code.

2. Check the coil of Pre-charge relay, if OL not shown, then the relay is damaged. Replace Precharge relay.



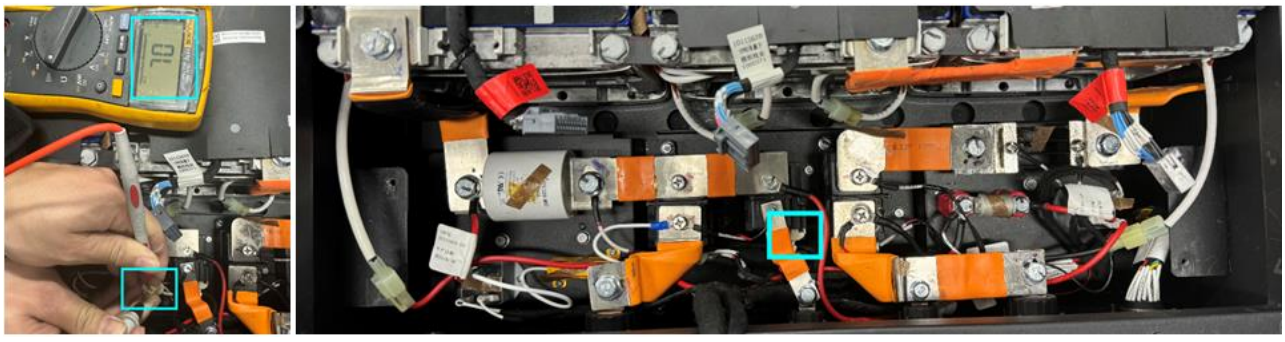
14.101 BMS 56 Battery Charge Contactor Coil Short

Tool: Multimeter



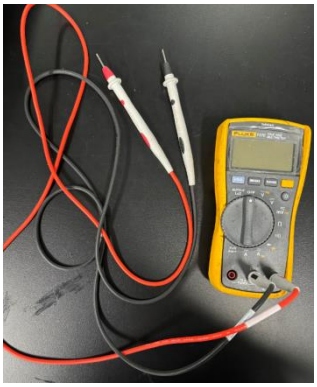
Check:

1. Display pop up BMS 56 fault code.
2. Check the coil of the charge relay, OL not shown, relay damage, Replace charge relay.



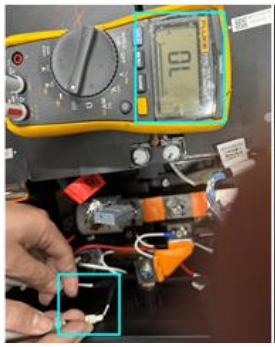
14.102 BMS 57 Battery Heating Contactor Coil Short

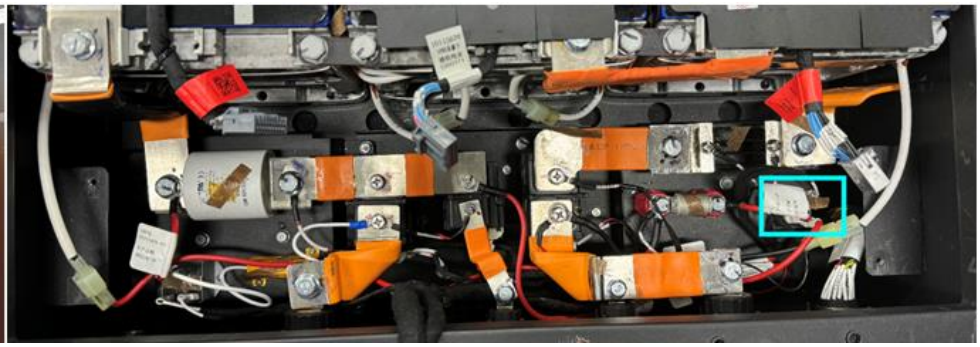
Tool: Multimeter



Check:

1. Display pop up BMS 57 fault code.
2. Check the coil of the heating relay, if OL not shown, the relay is damaged. Replace heating relay.





14.103 BMS 58 Battery Continuous Discharge Overcurrent

Check:

1. Display pop up BMS 58 fault code.
2. Reduce load.