Flash Code	TYPE	Name	Possible Causes	SET CONDITION	Clear Condition	Fault Action	Source of failure
11	1	Severe Undervoltage	• Defective controller • Defective battery	The undervoltage cutback is 0 for 64ms with the main relay on	Raise the Keyswitch Voltage above the brownout voltage	Shut down throttle	controller
12	1	Undervoltage Cutback	Low battery	The undervoltage cutback is less than 100% with the main relay on	Raise the Keyswitch Voltage above the user undervoltage threshold	Cutback the current limit	controller
13	1	Severe Overvoltage	• Incorrect battery voltage • Defective main relay • Defective controller ADMain relay defective Controller AD defective	The capacitor voltage is 10V above the allowed maximum voltage	Cycle the keyswitch.	Shut down motor Shut down main contactor Shut down throttle Shut down EM brake	controller
	2			The keyswitch voltage is 4V above the allowed maximum voltage.			controller
14	1	Overvoltage Cutback	• Incorrect battery voltage • Defective main relay	The battery voltage is greater than the user overvoltage threshold for 64ms during the regen state or when the motor	Lower the battery voltage until it is under the user overvoltage threshold.	Cutback the current limit	controller
15	1	Controller Severe Undertemp	• Defective temperature sensor • Low ambient temperature	The controller temperature is less than or equal to -40°C	Raise the controller temperature above -40°C	Shut down throttle	controller
16	1	Controller Overtemp Cutback	• Defective temperature sensor • High current for an extended period	The controller temperature is greater than or equal to the temperature cutback point	Lower the controller temperature to under the temperature cutback	Cutback the current limit	controller
17	1	Controller Severe Overtemp	Defective temperature sensor	The controller temperature is at least 15°C higher than the temperature cutback point	Lower the controller temperature to under the temperature cutback	Shut down throttle	controller
21	1	Throttle Fault	• Throttle wiring fault • Incorrect throttle type setting • Incorrect throttle operation • Steering angle pot wiring fault	The throttle AD data is out of range for 48ms.	Cycle KSI	Shut down throttle	controller
	2			The HPD Sequencing fault is active for 10s.			controller
	3			The steering angle AD data			controller
	4			The throttle calibration process failed			controller
22	1	HPD Sequencing	• Incorrect throttle operation • Defective throttle	At least 10% throttle is applied for 48ms before the interlock state changes to on.	Release the throttle before 10s expires. If the HPD Sequencing fault is active for more than 10s, the	Shut down throttle	controller
23	1	Main Relay Welded	Main relay defective	The Capacitor Voltage is greater than (Keyswitch Voltage − 0.7V), and the capacitor bank voltage drop is less than 1.5V after the Main Welded PWM is applied to the	Cycle KSI	Shut down motor Shut down main contactor Shut down throttle Shut down interlock	controller
24	1	Main Relay Did Not Close	• Defective main relay • Incorrect Pull In Voltage	The difference between the keyswitch voltage and capacitor voltage is greater than the DNC Voltage Threshold for 96ms when the relay is	Cycle KSI	Shut down motor Shut down main contactor Shut down throttle Shut down interlock	controller
	2			The difference between the keyswitch voltage and capacitor voltage is greater than the DNC Voltage Threshold for			controller
25	1	Main Driver Fault	Defective main relay driver	Main relay feedback is high when the relay is on for 100ms	Cycle KSI	Shut down motor Shut down main contactor Shut down throttle Shut down interlock	controller
	2			Main relay feedback is low when the relay is off for 100ms			controller
26	1	Precharge Failed	The PTC resistor in the precharge circuit is defective.	The Capacitor Voltage is less than 65% of the Keyswitch Voltage for 500ms after the Keyswitch Voltage is greater than 60% of the nominal	Cycle KSI	Shut down motor Shut down main contactor Shut down throttle Shut down interlock	controller
	2			The Capacitor Voltage is less than (Keyswitch Voltage − 4V) before the			controller
31	1	Stall Detected	• Defective motor • Defective controller	The armature current is greater than 90% of the current limit and the motor speed is less than 10% of		Shut down motor Shut down main contactor Shut down throttle Shut down interlock	controller

32	1	Motor Short	The motor is open or shorted.	The capacitor voltage drop is greater than 1V after 10% PWM was applied to the motor for 500µs at startup.	Cycle KSI	Shut down motor	controller
	2			The motor is shorted.		Shut down main contactor Shut down EM brake Shut down throttle Shut down interlock Open armature	controller
	3			The motor was open when the system was			
	4			The voltage on motor phase M1 is less than 3.5V after the main relay			
33	1	Motor Open	Motor open	The battery is disconnected.	Make sure the battery is connected, then cycle the keyswitch.	Shut down motor Shut down main contactor Shut down EM brake Shut down throttle Shut down interlock Open armature	controller
34	1	EMbrake failed To Set	EM brake defective	The motor speed is greater than the Fault Motor Revs parameter for 80ms when the EM brake	The throttle is applied.	No action	controller
41	1	Push SRO	Incorrect operation sequence Controller defective		Push input off	Shut down motor Shut down main contactor Shut down throttle	controller
42	1	Interlock SRO Fault	Incorrect operation sequence Controller defective	The interlock input is on when the keyswitch is turned on and the Interlock Type parameter	Cycle KSI	Shut down motor Shut down main.contactor Shut down throttle Shut down interlock	controller
43	1	Low BDI	Battery over discharged	The BDI percentage is less than the Low BDI Threshold	Charge the battery until the BDI percentage is greater than Low	Maximum speed reduced to Low BDI Max Speed	controller
44	1	Speed Supervision	The speed is outside of the allowed range.	The motor speed is greater than 120% of the allowed maximum speed for more than 500ms.	Cycle KSI	Shut down motor Shut down main contactor Shut down EM brake Shut down throttle Shut down interlock Open armature	controller
	2			The motor speed is greater than the ramped speed curve for more than 80ms while the vehicle is decelerating.			controller
	3			The motor speed is greater than the ramped speed curve for more than 80ms during interlock braking.			controller
	4			The motor speed is greater than the ramped speed curve for more than 80ms while the vehicle is decelerating during emergency reverse.			controller
	5			The motor speed is greater than the following for more than 2s: Ramped throttle command percentage * maximum speed + 20% of maximum			controller
51	1	Over Current Fault	Controller defective Current sensor defective	The armature current is greater than 120% of the current limit for 160ms.	Cycle KSI	Shut down motor Shut down main contactor Shut down EM brake Shut down throttle Shut down interlock	controller
52	1	Current Sense Fault	Current sampling circuit defective	The zero current point is out of range for 160ms (the range is 812±32).	Cycle KSI	Shut down motor Shut down main contactor Shut down throttle Shut down interlock	controller
	2			The AD data for the current is out of the allowed range.			controller
53	1	Driver Fault	Driver open or short Incorrect parameter settings	EM Brake driver is open or shorted.	Cycle KSI	Shut down motor Shut down main contactor Shut down EM brake Shut down throttle	controller
	2			Lift driver is open or shorted.		Shut down lift	controller
	3			Lower driver is open or shorted.		Shut down lower	controller
	4			Horn driver is shorted.		Shut down horn	controller

54	1	PUMP SRO Fault	Incorrect operation sequence Switch defective Incorrect parameter settings	The lift input is active when the keyswitch is turned on.	Cycle KSI	Shut down lift	controller
	2			The lower input is active when the keyswitch is turned on.	Cycle KSI	Shut down lift and lower	controller
	3			The controller did not receive CAN lift or CAN lower PDO messages	The Lift Input State and Lower Input State must both be off.	Shut dowm lift and lower	controller
	4			The Lift On Interlock parameter specifies On and the lift input is active when the interlock state	The Lift Input State and Lower Input State must both be off.	Shut down lift	controller
	5			The Lower On Interlock parameter specifies On and the lower input is active when the interlock	The Lift Input State and Lower Input State must both be off.	Shut down lift and lower	controller
55	1	EMR SRO Fault	• Defective emergency reverse switch • Incorrect operation sequence	The emergency reverse switch is active when the keyswitch is turned on.	Cycle KSI	Shut down throttle	controller
	2			The emergency reverse switch is active when the interlock input is	EMR Switch off		controller
	3			The absolute value of the throttle demand is greater than 10% after an emergency	Release throttle		controller
56	1	Creep SRO Fault	Incorrect operation sequence Cost	The creep input is on when the keyswitch is turned on.	Turn off the creep input.	Shut down throttle	controller
	2			The creep input is on but the interlock state has been off for 40ms.	Turn off the creep input.		controller
	3			The interlock state is on for 40ms during creep mode	Turn off creep mode and the interlock.		controller
	4			The controller cannot abort the creep brake state after the Interlock Brake Timeout expires.	Turn off creep mode and the interlock.		controller
57	1	Inching SRO Fault	Incorrect operation sequence	The inching forward or inching reverse input is on when the keyswitch is	Turn off the inching forward and inching reverse inputs.	Shut down throttle	
	2			The inching forward or inching reverse input is on	Turn off the inching forward and inching reverse inputs.		
	3			The interlock state is on for 40ms during inching	Turn off inching forward, inching reverse and interlock inputs		
61	1	PDO Timeout	CAN bus too heavy		Cycle KSI or NMT reset	Shut down throttle	controller
	2		Incorrect parameter setting		communication command received	Clear related data	controller
	5						controller
62	SDO Abort ID	PDO Mapping Error	Incorrect variable data length Incorrect access mode	• Incorrect data size specified for an object • Incorrect access mode	Cycle KSI	No action	controller
71	1	Hardware Fault	MOSFET defective Micro defective	The motor voltage is out of range for 64ms while the final PWM output is between 25–75%	Cycle KSI	Shut down motor Shut down main contactor Shut down EM brake Shut down throttle Shut down interlock	controller
	2			The belly button check is enabled and the emergency reverse NO or NC input’s voltage is less than 1.5V for 100ms.			controller
	3			UID encryption failed or the microprocessors are not in productive mode.			controller
	4			The CAN programming device’s OEM code differs from the hardware’s OEM code.			controller
72	1	Software Fault	Internal communication failed Incorrect firmware Change controller	Unmatched supervisor firmware	Cycle KSI	Shut down motor Shut down main contactor Shut down EM brake Shut down throttle Shut down interlock	controller
	2			Test mode was exited.			controller
	3		Received CAN Node Reset command during running	The Node Reset command is received when the motor speed is greater than 1.00V or the armature current is greater than (1/16 * Drive			controller
80		Mode fault	The turtle speed button detects closure before it is turned on.			1. Whether the handle speed button is pressed and glued; 2.turtle speed button under the micro switch is normally closed state, replace the micro switch	handle

81	CAN index of	Invalid parameter value	Incorrect variable data	A parameter’ s value is outside of its allowed data range.	Cycle KSI	Shut down motor Shut down main contactor Shut down throttle	controller
82		Lower fault	The down button is detected to be pressed before it is turned on.			1. Whether the handle speed button is pressed and glued; 2, turtle speed button under the micro switch is normally closed state, replace the micro switch	handle
82	1	Parameter Fault	Incorrect parameter settings FRAM defective	A parameter marked as [PCF] in the Programming Menu Parameters chapter was set but the keyswitch has not been cycled.		Shut down motor Shut down main contactor Shut down throttle Shut down interlock	controller
	2			The Steering Input Type parameter specifies an analog input but the Throttle Type parameter does not specify a CAN throttle.			controller
	3			Two or more flexible switch inputs are assigned to the same function.			controller
	4			• The Steering Angle 1 parameter is greater than or equal to Steering Angle 2. • The Steering Angle 1 or Steering Angle 2 parameter is greater than Steering Angle Max. • The speed mode’ s Fwd Max Speed parameter is less than or equal to Fwd Min Speed. • The speed mode’ s Rev Max Speed parameter is less than or equal to Rev Min Speed. • Speed Limit HPD specifies On, and mode 1’ s Fwd Max Speed is greater than mode			controller
	5			• The EMR Input Type parameter specifies NC Switch Input but the emergency reverse NC function is not assigned to a flexible switch input. • The Steering Input Type parameter specifies NC Switch Input but the steering function is not assigned to a flexible			controller
	6			The Pot Hi Switch Function parameter specifies a value other than Pot Hi Input but the Throttle Type			
	7			The Inching Input Source parameter specifies Inching Switch but the inching function is not assigned to a flexible			
83		BMS Communication Outage	1. Lithium battery BMS are damaged. 2. The communication line between the lithium battery and the handle is broken. 3. The communication module of the handle is			1. Replace the lithium battery; 2. Replace the handle wiring harness, main controller wiring harness and main power supply wiring harness;	handle
83	Block num	FRAM operation failed	FRAM operation failed	Read FRAM failed.	Cycle KSI	Shut down motor Shut down main contactor Shut down EM brake Shut down throttle Shut down interlock Shot down drivers	controller
	2			Write FRAM failed.			
	3			Restore parameters failed during flashing.			
	4			Saving the brownout flag failed.			
	5			Block number is out of range.			

84	See Table 7-2	Supervision	Cross check failed	Cross check failed	Cycle KSI	Shut down motor Shut down main contactor Shut down EM brake Shut down throttle Shut down interlock	controller
84		throttle FAULT	Before entering the password, the accelerator is not in the middle position. You need to reset the accelerator to remove the			1. If the accelerator is in the middle position, restart the power supply and check whether the fault is removed.	handle
85		Controller Communication Outage	1. Controller BMS are damaged. 2. The communication cable between the controller and the handle is broken. 3. The communication			1. Replace the controller; 2. Replace the handle wiring harness and main controller wiring harness; 3. Replace the handle;	handle
87		Lift system failure	Pump station output continuous operation, lifting system failure, possibly lifting micro switch failure			1. Limit switch can not be triggered, adjust the electric control board; 2, limit switch normally closed contact short circuit; 3. Adhesion of lifting	handle
90		Over Voltage 电池过压故障	1. The charger may be overcharged. 2. Battery BMS have problems. 3, the vehicle for a long time downhill, caused by			1. The charger is overcharged, and the cut-off voltage of the charger is too high; 2. Replace the battery; 3. Caused by vehicles going	Lithium battery
91		Over Discharge	1. Lithium battery is not used for a long time, resulting in low battery			Periodic recharge of battery;	Lithium battery
92		Communication Outage	Communication between the battery and the controller times out			Replace the battery	Lithium battery
93		Under Voltage	1. Long-term storage without timely charging. 2. The internal cell of the battery is damaged, resulting in the inability to			1. Regular recharge of battery; 2. Replace the battery;	Lithium battery
94		Over Current	1. Replace the controller; 2. Controller parameter modification;			1. Replace the controller; 2. Controller parameter modification;	Lithium battery
95		Over Temperature Protect	The battery temperature is too high, which causes high temperature inside the battery during use or			1. The internal temperature of the battery is too high. 2. If the temperature sensor inside the battery fails,	Lithium battery
96		Temperature Protect	The battery temperature is too high, which causes high temperature inside the battery during use or			1. The temperature inside the battery is too high. 2. If the temperature sensor inside the battery fails,	Lithium battery