TriStar PWM

Fault

Bit	#	Fault	LED Indication	Description	Charge	Load	Diversion	Causes	Solutions	Additional Info
0	1	External Short	R/G - Y	Hardware detected an external short circuit	✓	✓	✓	A short occurred on a power cable; A system miswire	Inspect the system wiring for shorts, damaged insulation, etc.; Be sure the positive input/output power terminals are not wired together	
1	2	Overcurrent	G - Y/R	The charge or load current exceeds the TriStar rating	✓	✓	✓	PV Array is too large, or Load is too large; The current sense circuitry is malfunctioning	Consult the TriStar documentation for maximum current ratings; TriStar Requires Service or replacement	Auto-clears if PV current drops below controller rating
2	3	FET Short	R - Y - G	MOSFETs shorted	✓	✓	✓	A power MOSFET is damaged; An external short has occurred	Refer to the TriStar MOSFET Replacement instructions; Be sure there are no other power sources connected to the load circuit	Auto-clears if short removed
3	4	software	R - Y - G/Y	A software error has occurred in the processor	✓	✓	✓	Voltage on the Load terminals too low (Load Mode ONLY); Solar input voltage too low (Charge Mode ONLY)	Verify there are no other power sources connected to the load circuit; Ensure PV Voc is greater than battery voltage	
4	5	HVD	R - G	The battery voltage is above acceptable levels	✓			This is an internal software problem; Another charging source in the system is over-charging the battery	Update TriStar PWM firmware (see Morningstar Website); Remove the other charging source, check its operation and charging set point.	Auto-clears when battery voltage drops to safe level
5	6	TriStar Hot	R - Y	The TriStar Heatsink has exceeded acceptable operating	✓	✓	✓	Power MOSFETs may be shorted	Refer to the TriStar MOSFET Replacement instructions; Verify the TriStar has ample ventilation and spacing. Be sure ambient temp does not	Auto-clears if heatsink temp drops to safe level
6	7	DIP sw Changed	R - Y	DIP switch changed while running	✓	✓	✓	User changed a DIP switch during operation	Return the DIP switches to original position or reset the TriStar so that the new changes take effect. Check all DIP switches to ensure they are in full 'on' or 'off' position	DIP switch(s) not fully in on/off position
7	8	Settings Edit	R - Y - G	EEPROM setting edited while running	✓	✓	✓	A set point was changed via RS-232 during operation	Restart TriStar using MODBUS coil command or power cycle to reset	Dirt/Debris/Condensation
8	9	reset?	R - Y - G	A fault was interrupted (usually power-cycle)	✓	✓	✓	The power was cycled on the TriStar during a fault (any fault)	Clears 10sec after startup. Ensures that a power cycle will not clear a fault in less than 10 seconds.	
9	10	miswire	R - Y - G	System miswiring detected	✓	✓	✓	There is voltage on the load terminals when the MOSFETs are turned off; There is charge current into the battery	Verify there are no other power sources connected to the load circuit; Check for proper mode of operation. Check no power source connected	Auto-clears if miswire corrected
10	11	RTS Shorted	R - Y - G	A short has been detected in the Temp Sense cable	✓	✓	✓	The RTS cable has been pinched or otherwise shorted to Load terminals	Check DIP switches for proper mode of operation. Check no power source connected; Inspect RTS cable and connection	Auto-clears if short removed
11	12	RTS Disconnected	R/Y - G/Y	The RTS was properly connected. Now it's not connected.	✓	✓	✓	There is a miswire on Battery Sense or Temp Sense connections.	Inspect the RTS and Battery Sense connections	Auto-clears if RTS reconnected; reboot unit without RTS to clear fault and
12	13	RTS Miswire	R/Y - G/Y	There is a miswire on the RTS connection	✓	✓	✓	The RTS cable has been severed or otherwise disconnected.; Battery Sense wired to Temp Sense terminals	Inspect the RTS connection and cable; Inspect the RTS and Battery Sense connections	Auto-clears if miswire corrected

Alarm

Bit	#	Alarm	LED Indication	Description	Charge	Load	Diversion	Causes	Solutions	Additional Info
0	1	RTS open	R/Y - G/Y	Remote Temp Sensor not connected	✓	✓	✓	RTS not connected	RTS not required for operation, RTS can be connected if desired for more accurate temperature compensated charging	
1	2	RTS Shorted	R/Y - G/Y	Remote Temp Sensor shorted	✓	✓	✓	There is a miswire on Battery Sense or Temp Sense shorted	Inspect RTS cable and connection	
2	3	RTS Disconnected	R/Y - G/Y	The RTS cable has been severed or otherwise connections.	✓	✓	✓	The RTS cable has been severed or otherwise connections.	Inspect the RTS connection and cable	
3	4	Ths Shorted	R - Y	Heatsink temp sensor short circuit	✓	✓		RT1 on the PCB is damaged or shorted	Check for debris, replace Heatsink thermistor	
4	5	Ths Disconnected	R - Y	Heatsink temp sensor open circuit	✓	✓		RT1 on the PCB is damaged or open	Replace the Heatsink thermistor	
5	6	TriStar Hot	R - Y	The TriStar heatsink temperature is approaching temperature limits	✓	✓		Controller is too hot	Verify the TriStar has ample ventilation and spacing. Be sure ambient temps do not exceed the TriStar's operating temperature range.	
6	7	Current Limit		An overcurrent condition has put the TriStar into current limit	✓	✓	✓	Charging current is too high.; Diversion load is too large	Reduce the amount of PV connected to the controller; Refer to the TriStar documentation for correct diversion load sizing	In Diversion Mode, reverts to On/Off operation
7	8	Current offset		There is a current reading even though the MOSFETs should be off.	✓	✓	✓	Power MOSFETs Shorted	Refer to the TriStar MOSFET Replacement instructions	
8	9	Battery Sense	R/Y - G/Y	Battery sense voltage out of acceptable range	✓	✓	✓	Damage to internal current measurement circuit; Disconnected wire on the Battery Sense Voltage	Contact Morningstar for service; Inspect Battery Sense connection	
9	10	Battery Sense	R/Y - G/Y	Battery sense voltage out of acceptable range	✓	✓	✓	Greater than 5V difference between Sense and Battery Voltage	Inspect Battery sense wires and connection. Inspect Battery power cables and connection.	
10	11	Batt Sense Disc	R/Y - G/Y	Battery sense was working, now out of range	✓	✓	✓	Greater than 5V difference between Sense and Battery Voltage; Disconnected wire on the Battery Sense Voltage	Inspect Battery Sense connection. Inspect Battery sense wires and connection. Inspect Battery power cables and connection.	
10	11	Uncalibrated		Factory calibration was not performed	✓			Factory calibration was not performed to trim voltage and current readings.	Contact Morningstar for service	
11	12	RTS Miswire	R/Y - G/Y	Temp Sense connection wired incorrectly	✓	✓	✓	Battery Sense wired to Temp Sense	Inspect Temp Sense connection	

Bit	Fault	LED Indication Description	Charge	Load	Diversion	Causes	Solutions	Additional Info
12 13	HVD	Indicates high battery voltage in diversion			✓	Undersized diversion load/too much charge current	Refer to the TriStar operators manual for diversion mode system sizing.	
13 14	high d	The TriStar is nearing 100% diversion, beyond which the TriStar can no longer regulate the battery.			✓	Load is disconnected or damaged / Power MOSFETs damaged / Undersized diversion load/too much charge current	Check load wiring and diversion loads / Refer to the TriStar MOSFET Replacement instructions / Refer to the TriStar operators manual for diversion mode system sizing.	
14 15	miswire	There is voltage on the load terminals when the MOSFETs are	✓	✓	✓	Load is disconnected or damaged / Power MOSFETs damaged / System wiring problem / Another power source is wired to the load circuit	Check load wiring and diversion loads / Refer to the TriStar MOSFET Replacement instructions / Ensure positive input/output terminals are not wired together / Verify that the TriStar is the only device wired to the diversion load bank.	Check to ensure Diversion mode selected with DIP switches
15 16	FET open	MOSFETs open	✓	✓	✓	Power MOSFETs damaged	Refer to the TriStar MOSFET Replacement instructions	In Load/Diversion Mode, load must be
16 17	P12	Internal power supply problem	✓	✓		Dirt/Debris/Condensation on the PCB / Damage to internal circuitry	Inspect the circuits for moisture, corrosion, debris / Contact Morningstar for service	Can only be present if battery voltage >13V
17 18	unused							
18 19	Power On Reset	Controller power loss and reboot (daily alarm only)				Controller rebooted	None Required	Appears in Daily Alarms only
19 20	LVD condition	Low Voltage Disconnect occurred (daily alarm only)		✓			None Required	Appears in Daily Alarms only
20 21	Log Timeout	24hrs since last log entry write (daily alarm only)			✓		In Charge Mode, PV voltage may not be dropping enough during nighttime, check if ambient light is keeping PV voltage high during nighttime hours	Appears in Daily Alarms only