

Tristar PWM

Bit	Fault	LED Indication	Description	Charge Load	Diversion	Causes	Solutions	Additional Info
0	External Short	R/G - Y	Hardware detected an external short circuit	✓	✓	A short occurred on a power cable	Inspect the system wiring for shorts, damaged insulation, etc. Be sure the positive input/output power terminals are not wired together	Auto-clears if PV current drops below controller rating
1	Overcurrent	G - Y/R	The charge or load current exceeds the Tristar rating	✓	✓	PV Array is too large or Load is too large	Consult the Tristar documentation for maximum current ratings	Auto-clears if short removed
2	FET Short		MOSFETs shorted	✓	✓	The current sense circuitry is malfunctioning	Tristar Requires Service or replacement	Auto-clears if short removed
3	Software	R - Y - G	A software error has occurred in the processor	✓	✓	A power MOSFET is damaged	Refer to the Tristar MOSFET Replacement instructions	
4	HVD	R - G	The battery voltage is above acceptable levels	✓	✓	An external short has occurred	Be sure the positive input/output power terminals are not wired together	
5	Tristar Hot	R - Y	The Tristar heatsink has exceeded acceptable operating	✓	✓	Voltage on the Load terminals (Load Mode ONLY)	Verify there are no other power sources connected to the load circuit	
6	DIP sw Changed		DIP switch changed while running	✓	✓	Solar input voltage too low (Charge Mode ONLY)	Ensure PV Voc is greater than battery voltage	Auto-clears when battery voltage drops to safe level
7	Settings Edit	R - Y - G	EEPROM setting edited while running	✓	✓	This is an internal software problem	Update Tristar PWM firmware (see Morningstar Website)	
8	reset?	R - Y - G	A fault was interrupted (usually power-cycle)	✓	✓	Another charging source in the system is over-charging	Remove the other charging source, check its operation and charging set point.	
9	Miswire	R - Y - G	System miswiring detected	✓	✓	Power MOSFETs may be shorted	Refer to the Tristar MOSFET Replacement instructions	
10	RTS Shorted	R/Y - G/Y	A short has been detected in the Temp Sense cable	✓	✓	Controller is too hot	Verify the Tristar has ample ventilation and spacing. Be sure ambient temp does not return the DIP switches to original position or reset the Tristar so that the new changes take effect.	
11	RTS Disconnected	R/Y - G/Y	The RTS was properly connected. Now it's not connected.	✓	✓	User changed a DIP switch during operation	Check all DIP switches to ensure they are in full 'on' or 'off' position	
12	RTS Miswire	R/Y - G/Y	There is a miswire on the RTS connection	✓	✓	DIP switch(es) not fully in on/off position	Check the PCB around the DIP switches for moisture, corrosion, debris	
13	RTS Miswire	R/Y - G/Y	There is a miswire on the RTS connection	✓	✓	Dirty/Debris/Condensation	Inspect the PCB around the DIP switches for moisture, corrosion, debris	
0	Alarm	LED Indication	Description	Charge Load	Diversion	Causes	Solutions	Additional Info
0	RTS open		Remote Temp Sensor not connected	✓	✓	A set point was changed via RS-232 during operation	Restart Tristar using MODBUS coil command or power cycle to reset	
1	RTS Shorted	R/Y - G/Y	Remote Temp Sensor shorted	✓	✓	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.	Auto-clears if RTS reconnected, reboot unit without RTS to clear fault and Auto-clears if miswire corrected
2	RTS Disconnected	R/Y - G/Y	The RTS was properly connected. Now it's not connected.	✓	✓	There is voltage on the load terminals when the MOSFETs are turned off	Verify there are no other power sources connected to the load circuit	
3	This Disconnected	R - Y	Heatsink temp sensor open circuit	✓	✓	There is charge current into the battery	Check DIP switches for proper mode of operation. Check no power source connected to load terminals	
4	This Shorted	R - Y	Heatsink temp sensor short circuit	✓	✓	The RTS cable has been pinched or otherwise shorted	Check DIP switches for proper mode of operation. Check no power source connected to load terminals	
5	Tristar Hot	R - Y	The Tristar heatsink temperature is approaching temperature limits	✓	✓	The RTS cable has been severed or otherwise disconnected.	Inspect RTS cable and connection	
6	Current limit		An overcurrent condition has put the Tristar into current limit	✓	✓	The RTS cable has been severed or otherwise disconnected.	Inspect the RTS and Battery Sense connections	
7	Current offset		There is a current reading even though the MOSFETs should be off.	✓	✓	RTS not connected	RTS not required for operation, RTS can be connected if desired for more accurate temperature compensated charging	
8	Battery Sense	R/Y - G/Y	Battery sense voltage out of acceptable range	✓	✓	The RTS cable has been pinched or otherwise shorted	Inspect the RTS cable and connection	
9	Batt Sense Disc	R/Y - G/Y	Battery sense was working, now out of range	✓	✓	There is a miswire on Battery Sense or Temp Sense connections.	Inspect the RTS and Battery Sense connections	
10	Uncalibrated	R/Y - G/Y	Factory calibration was not performed	✓	✓	The RTS cable has been severed or otherwise disconnected.	Inspect the RTS connection and cable	
11	RTS Miswire	R/Y - G/Y	Temp Sense connection wired incorrectly	✓	✓	RT1 on the PCB is damaged or open	Replace the Heatsink thermistor	
12	RTS Miswire	R/Y - G/Y	Temp Sense connection wired incorrectly	✓	✓	RT1 on the PCB is damaged or open	Check for debris, replace Heatsink thermistor	
				✓	✓	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.	In Diversion Mode, reverts to On/Off operation
				✓	✓	Charging current is too high	Reduce the amount of PV connected to the controller	
				✓	✓	Diversion load is too large	Refer to the Tristar documentation for correct diversion load sizing	
				✓	✓	Power MOSFETs shorted	Refer to the Tristar MOSFET Replacement instructions	
				✓	✓	Damage to internal current measurement circuit	Contact Morningstar for service	
				✓	✓	Disconnected wire on the Battery Sense	Inspect Battery Sense connection	
				✓	✓	Greater than 5V difference between Sense and Battery Voltage	Inspect Battery sense wires and connection. Inspect Battery power cables and connection.	
				✓	✓	Disconnected wire on the Battery Sense	Inspect Battery Sense connection	
				✓	✓	Greater than 5V difference between Sense and Battery Voltage	Inspect Battery sense wires and connection. Inspect Battery power cables and connection.	
				✓	✓	Factory calibration was not performed to trim voltage and current readings.	Contact Morningstar for service	
				✓	✓	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				Under-sized 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 Under-sized 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	Check load wiring and diversion loads Refer to the TriStar MOSFET Replacement instructions Ensure positive input/output terminals are not wired together	Check to ensure Diversion mode selected with DIP switches
15	16	FET open	MOSFETs open				Another power source is wired to the load circuit Power MOSFETs damaged	Verify that the TriStar is the only device wired to the diversion load bank. Refer to the TriStar MOSFET Replacement instructions	In Load/Diversion Mode, load must be
16	17	PI2	Internal power supply problem				DIR/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					Controller rebooted	None Required	Appears in Daily Alarms only
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)				Controller rebooted	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
20	21	Log Timeout	24hrs since last log entry write (daily alarm only)				Controller rebooted		Appears in Daily Alarms only