

## Open Wizard

The TriStar MPPT Setup Wizard is used to configure a TriStar MPPT with Custom Setpoints.

Open the *TriStar MPPT Setup Wizard* from the *Tools* menu:

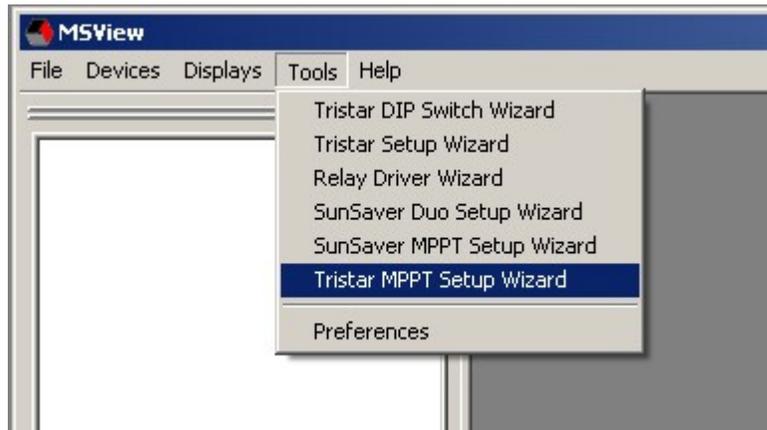


Figure 1. The TriStar MPPT Setup Wizard is found in the Tools menu

The Summary Screen below should appear (After two Warning screens).

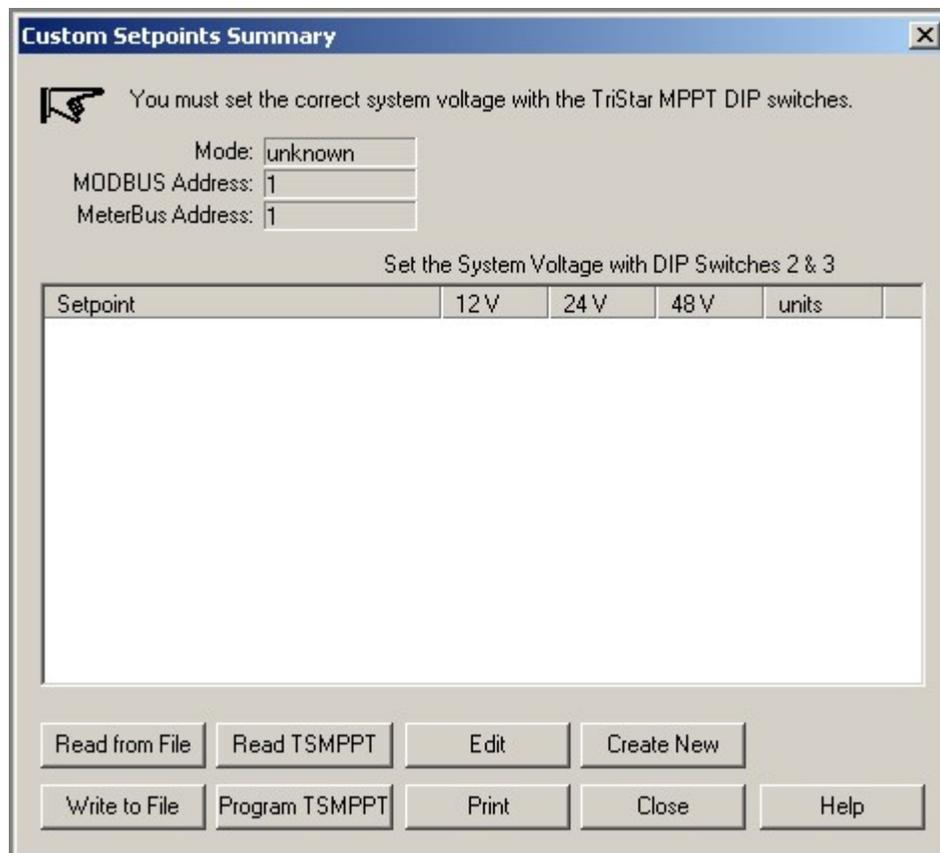


Figure 2. TriStar MPPT Summary Screen

The buttons located on the Summary Screen are defined as follows:

**Write to File** – save a configuration for later use.

**Read from File** – retrieve past configurations saved to a file. You may also choose one of the 7 factory default configurations to use as a starting point for the new setpoints file.

**Read TSMPPT** – read the current configuration from the TriStar MPPT.

**Program TSMPPT** – write the wizard configuration to the TriStar MPPT.

**Edit** – make changes to the configuration currently displayed in the Summary window.

**Print** – print the configuration currently displayed in the Summary window.

**Create New** – create a new setpoints configuration file.

**Close** – close the TriStar MPPT Setup Wizard.

## ***Absorption Settings***

Configure the appropriate **Absorption** voltage for your battery type, along with **temperature compensation** and battery service reminders (if desired). When satisfied with your selections, click **Next >** to continue on to **Float Settings**.

The screenshot shows a software window titled "Charge Mode - PWM, Temp Comp, & Reminder". It contains the following settings:

- Absorption voltage: 14.10 V @ 25 degC
- Absorption time: 2 h 30 m 0 s
- Enable Absorption extension
  - Absorption extension voltage: 12.50 V
  - Absorption extension time: 3 h 0 m 0 s
- Battery Temperature Compensation: -0.030 V / degC
- Maximum Compensation Temp: -40 degC
- Minimum Compensation Temp: 80 degC
- Enable Maximum Regulation Limit
  - Maximum Regulation Limit: 15.00 V
- Enable Battery Current Limit
  - Battery Current Limit: 10.00 A
- Enable Battery Service Reminder
  - Battery Service Reminder: 60 days

At the bottom of the window are four buttons: "< Back", "Next >", "Cancel", and "Help".

Figure 3. TriStar MPPT Absorption Settings

### Absorption Voltage

The voltage at which the battery should come to full charge. For lead acid batteries, the Absorption voltage usually ranges from 14.0V (for gel type) to 15.0V (for L-16 battery types) [12V nominal values]. Check the battery manufacturer's specifications for proper absorption (regulation) voltage. This setpoint is temperature compensated.

### Absorption Time

The amount of time the controller should stay in the Absorption (regulation) charging stage before transitioning to Float charging (if enabled).

### Absorption Extension Voltage

The threshold at which the absorption time is extended to the Absorption Extension Time. If the battery voltage drops below this threshold, the Absorption Extension Time value is used in place of the standard Absorption Time value previously specified.

**Note:** Absorption Extension can be disabled by un-checking the *Enable Absorption Extension* checkbox.

### Absorption Extension Time

The absorption time used when the battery has dropped to below the Absorption Extension Voltage in the previous cycle.

### Battery Temperature Compensation

Battery chemistry changes with temperature. Temperature Compensation shifts the regulation setpoints with temperature. For lead-acid batteries, this value is typically around -0.030V/C (for a 12V battery). The reference temperature is 25C (zero compensation). Check the battery manufacturer's specifications. This setpoint is shared among all sets of custom setpoints.

### Maximum Compensation Temp

Maximum temperature at which temperature compensation is clamped.

### Minimum Compensation Temp

Minimum temperature at which temperature compensation is clamped.

### Max. Regulation Limit

The absolute limit on battery regulation voltage allowed by the controller. This is not a temperature compensated value. Protects high voltage sensitive system loads.

**Note:** Max. Regulation Limit can be disabled by un-checking the *Enable Maximum Regulation Limit* checkbox.

### Battery Current Limit

The absolute limit on battery charging current allowed by the controller. Used to more thoroughly meet specific battery charging requirements.

**Note:** Battery Current Limit can be disabled by un-checking the *Enable Battery Current Limit* checkbox.

### Battery Service Reminder

Specifies the number of days between battery service reminders. Sets an alarm and prompts the user to check water levels and battery health. Clear this alarm from the pushbutton, TriStar Meter, or MODBUS alarm reset command.

**Note:** Battery Service Reminders can be disabled by un-checking the *Enable Battery Service Reminder* checkbox.

**ALL SETPOINTS MUST BE SPECIFIED FOR A NOMINAL 12 VOLT SYSTEM. WHEN 24V / 48V SYSTEM VOLTAGE IS DETECTED, ALL SETPOINTS WILL BE MULTIPLIED ACCORDINGLY.**

## Float Settings

Configure the appropriate **Float** charging settings for your battery type. You may choose to enable or disable Float charging along with certain Float parameters. When satisfied with your selections, click **Next >** to continue on to **Equalize Settings**.

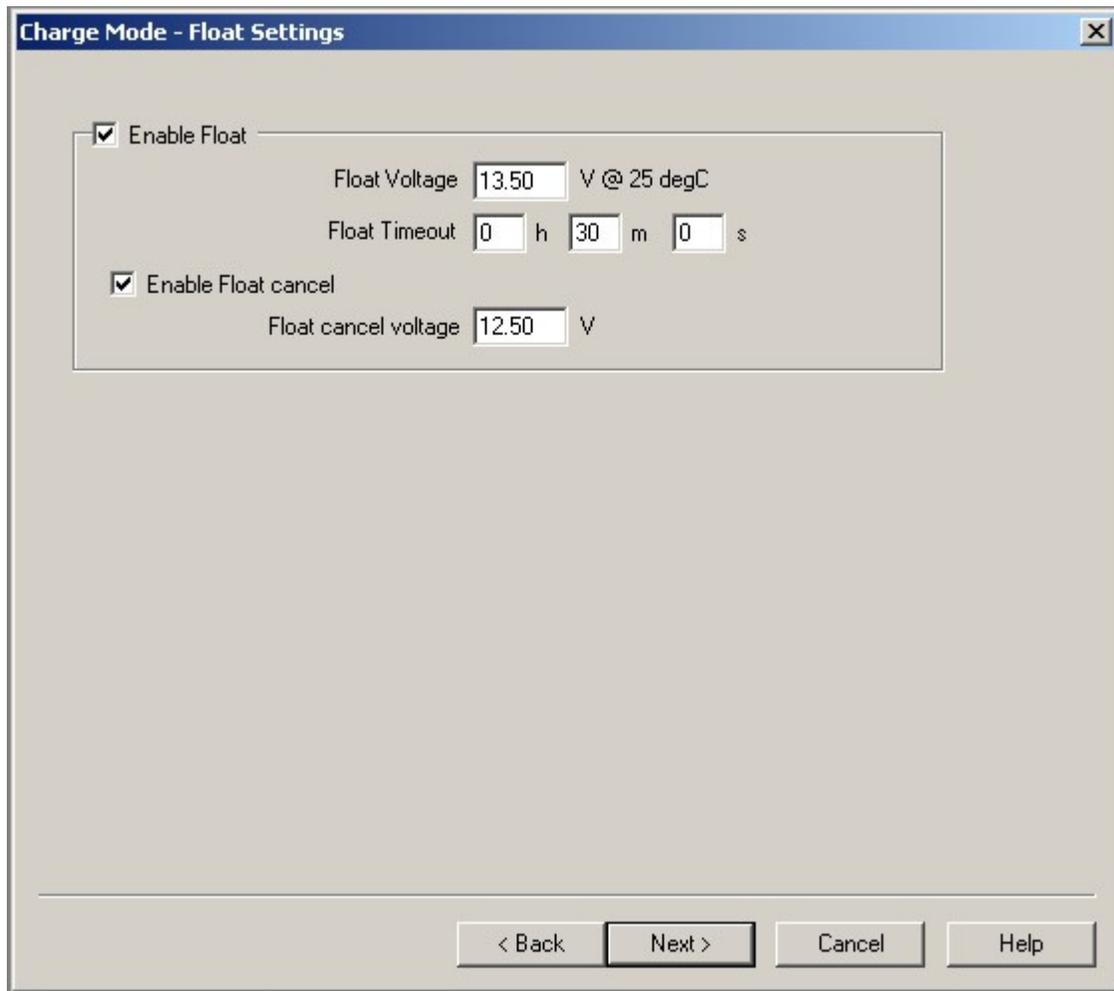


Figure 4. TriStar MPPT Float Settings

### Float Voltage

The Float charge stage follows Absorption. After the battery has come to full charge in the Absorption stage, the TriStar MPPT will drop to the lower Float stage voltage. Gassing is reduced and the battery is maintained at full state of charge. For lead-acid batteries, float voltage is typically between 13.4 - 13.7V. Check the battery manufacturer's recommendations. This setpoint is temperature compensated.

**Note:** Float stage can be disabled by un-checking the *Enable Float* checkbox.

### Float Timeout

Defines the length of time the controller will remain in Float after the battery voltage has dropped below the Float setpoint due to insufficient solar charge or heavy system loads. The Float Timeout counts cumulative time that the battery voltage is below the Float setpoint. When the timer expires, the TriStar MPPT will return to MPPT (Bulk) charging.

### Float Cancel Voltage

When the battery has been discharged much further than usual, it is better for the battery to cancel the Float stage of the next charging cycle. If the battery voltage drops below this threshold, the Float stage is canceled for the next charging cycle. This allows the battery to remain in Absorption charging longer and to recover from the deep discharge it has experienced.

**Note:** Float Cancel can be disabled by un-checking the *Enable Float Cancel* checkbox.

**ALL SETPOINTS MUST BE SPECIFIED FOR A NOMINAL 12 VOLT SYSTEM. WHEN 24V / 48V SYSTEM VOLTAGE IS DETECTED, ALL SETPOINTS WILL BE MULTIPLIED ACCORDINGLY.**

## Equalize Settings

Specify **Equalize charging** settings along with solar high voltage disconnect thresholds. Equalization charging may be disabled if your batteries do not require it. When satisfied with your selections, click **Next >** to continue on to **LED Settings**.

**Charge Mode - Equalize & HVD Settings**

Enable Equalize

Equalize Voltage  V @ 25 degC

Equalize Time  h  m  s

Auto Equalize interval  days

Equalize Timeout  h  m  s

Enable Battery HVC

High Voltage Disconnect  V

High Voltage Reconnect  V

< Back    Next >    Cancel    Help

Figure 5. TriStar MPPT Equalize / HVD Settings

### Equalize Voltage

Equalization levels the individual cell voltages within a battery, bubbles the electrolyte, and helps prevent sulfate build-up on the lead plates. Equalizations are usually not needed for sealed battery types. Check the battery manufacturer's recommendations. This setpoint is temperature compensated.

**Note:** Equalization can be disabled by un-checking the *Enable Equalize* checkbox.

### **Equalize Time**

Defines the amount of time for the Equalization Charge.

### **Auto Equalize Interval**

When in Auto-Equalization mode (DIP switch #7), this defines the number of days between Equalization Charges.

### **Equalize Timeout**

Defines the maximum length of time which can be spent in the Equalization stage when the battery voltage is above the Absorption setpoint. If the battery is charged above the Absorption voltage but has not yet reached the Equalize voltage, this value serves as a safety timeout to prevent partial equalizations for extended periods of time.

### **High Voltage Disconnect**

The battery voltage threshold at which the solar array is disconnected and charging is halted. If the battery voltage increases beyond this value, charging is stopped until battery voltage falls to a safe level.

**Note:** **HVD** can be disabled by un-checking the *Enable Battery HVD* checkbox.

### **High Voltage Reconnect**

The battery voltage threshold at which the solar array is reconnected and charging is resumed. If the solar array has been disconnected due to a High Voltage Disconnect, this is the threshold to which battery voltage must drop for charging to resume.

**ALL SETPOINTS MUST BE SPECIFIED FOR A NOMINAL 12 VOLT SYSTEM. WHEN 24V / 48V SYSTEM VOLTAGE IS DETECTED, ALL SETPOINTS WILL BE MULTIPLIED ACCORDINGLY.**

## ***LED Settings***

Determine when you would like battery state of charge LED transitions to take place (based on battery voltage). When satisfied with your selections, click **Next >** to continue on to [Logging Settings](#).

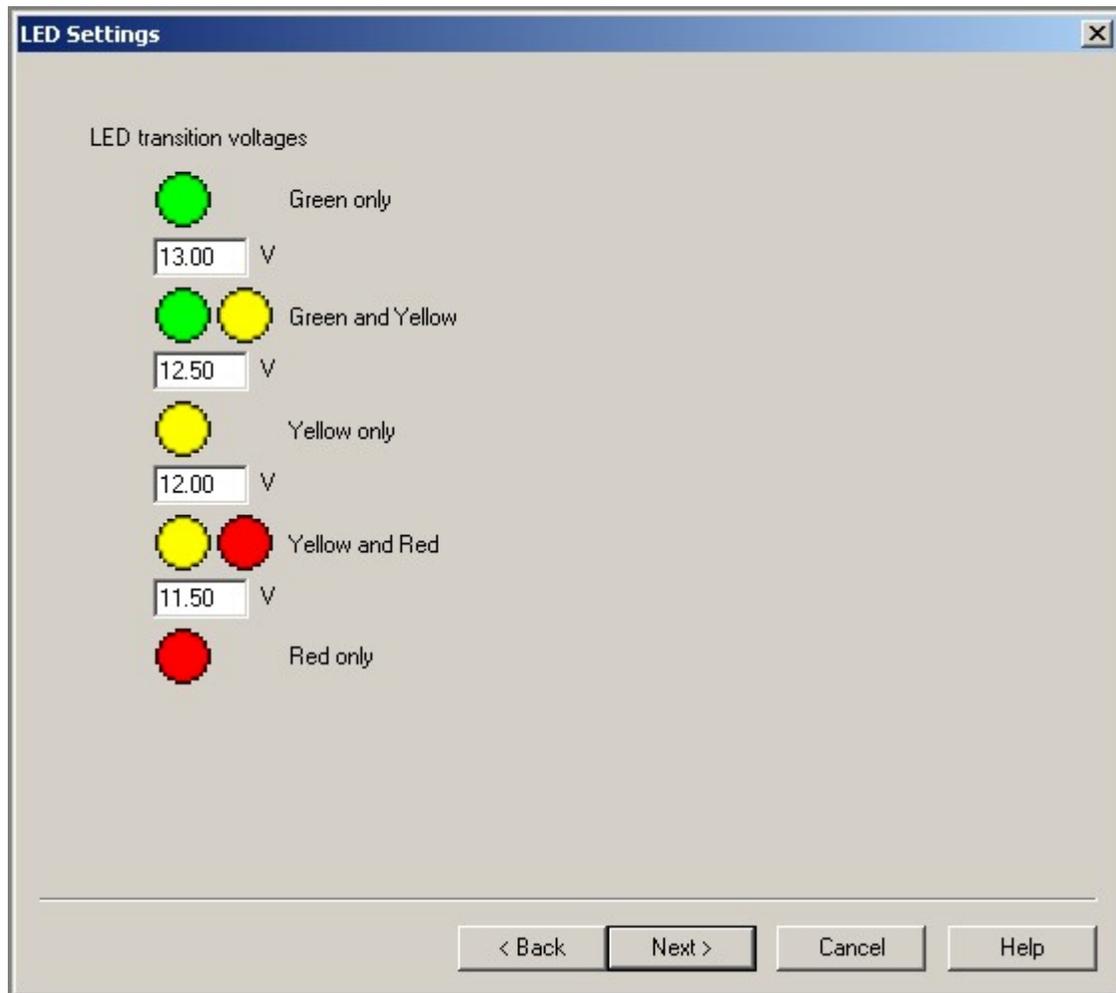


Figure 6. TriStar MPPT LED Transition Settings

### LED Transition Voltages

These are the battery voltages at which the Battery Status LEDs change from one color (or color combination) to the next. The same transition voltages are used for both rising and falling battery voltage.

**ALL SETPOINTS MUST BE SPECIFIED FOR A NOMINAL 12 VOLT SYSTEM. WHEN 24V / 48V SYSTEM VOLTAGE IS DETECTED, ALL SETPOINTS WILL BE MULTIPLIED ACCORDINGLY.**

### Logging

The TSMPPT has a portion of its non-volatile memory dedicated to storing logged data internally. As an alternative to running a logging application 24hrs per day, the TSMPPT will automatically log historical system data for later retrieval. This window allows you to choose which system variables the TSMPPT should log on a daily basis. When satisfied with your selections, click **Next >** to continue on to [Communication Settings](#).

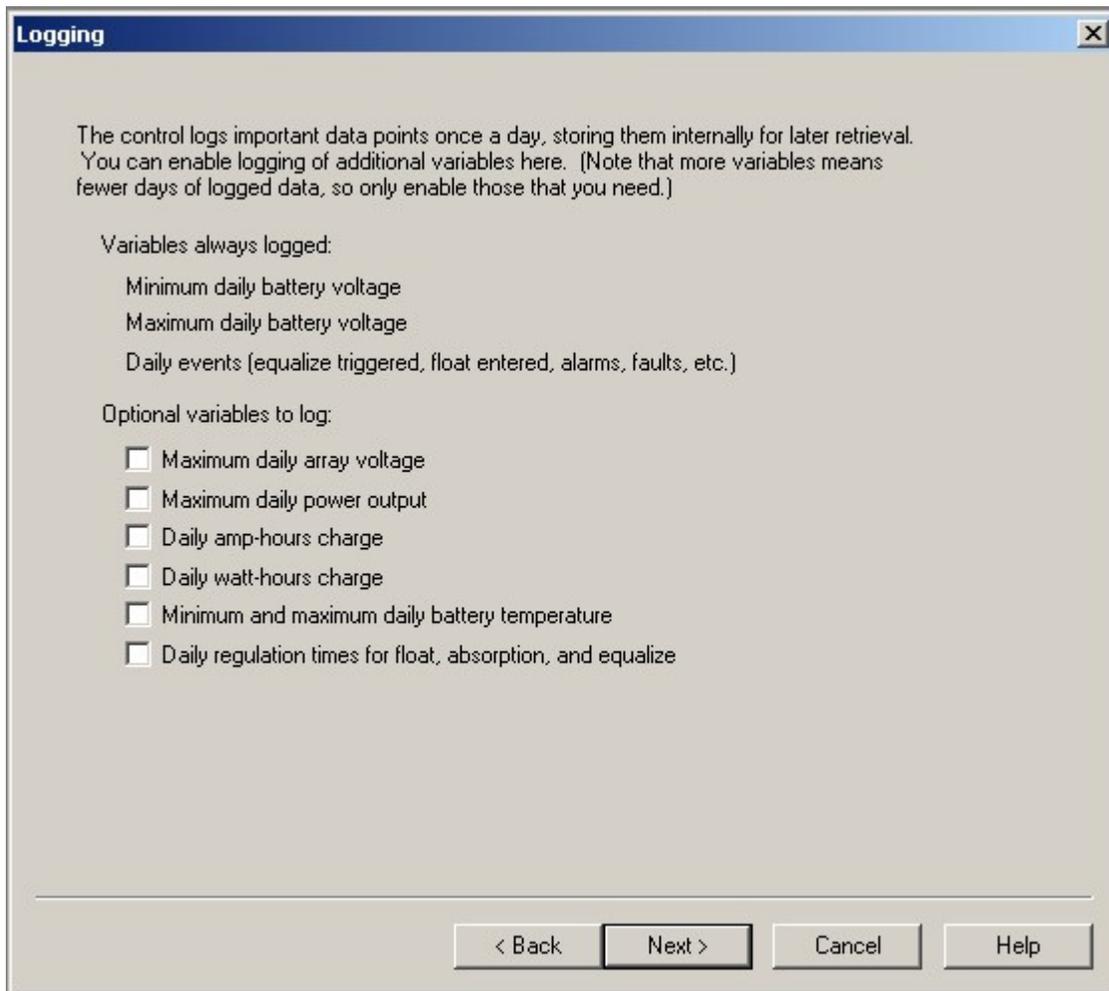


Figure 7. TriStar MPPT Internal Logging Setup

Please see [Retrieving Internal Log Data](#) for more information.

## Communication Settings

**\*\*\*These settings (except MeterBus™ / MODBUS® addresses) only apply to the TriStar MPPT 60 model.\*\*\***

Specify MeterBus™ and MODBUS® addresses as well as IP and Port settings. If you are unfamiliar with IP addressing and Port mapping, please consult your network administrator before you make any changes. When satisfied with your selections, click **Next >** to set up [Notifications](#).

Figure 8. TriStar MPPT Communications Settings

### MeterBus™ Address

A unique ID that distinguishes the TriStar MPPT from other devices on the Morningstar MeterBus™ network. The MeterBus™ network allows communication among Morningstar products via the RJ-11 connection. When setting up a TriStar MeterBus™ network, each device will need its own unique address. (You may also change MeterBus™ Addresses via the TriStar Meter 2.

Do not modify this value unless necessary.

Valid address range: 1-15 (default:1)

### TriStar MODBUS® Address

A unique ID that distinguishes the TriStar MPPT from other devices on a MODBUS® network. After modifying this value, the MSView Communication settings must be updated to the new address to resume communications.

Do not modify this value unless necessary.

Valid address range: 1-247 (default:1)



**WARNING:** After modifying the MODBUS® Address, the MSView communication settings must be

updated to the new address to resume communications with the TriStar.

### Controller Name

You may specify a unique name for the unit.

### IP Address

The Internet Protocol address used to communicate with the TriStar MPPT. See the [TriStar MPPT Networking](#) topic for more information. Consult your network administrator for assistance.

### HTTP Server Port

The TriStar MPPT port which receives HTTP data. Port 80 is a standard HTTP port. Do not change this unless necessary. Consult your network administrator for more information.

### MODBUS/TCP Port

Default is port 502 for MODBUS TCP/IP®. This is the port on which MSView communications will be received at the Morningstar device. Only change this value if you are configuring NAT/PAT through a firewall. Consult your network administrator for more information.

### **Checkbox: Enable Ethernet power-saving mode**

By checking this box, the Ethernet port will only be powered when the controller detects an active Ethernet connection. If there is no Ethernet connection, the port will power down (saving about 1-2W of power). Every minute the controller will check for a connection and, if found, will re-power the port for the duration of the connection.

### **Checkbox: Bridge MODBUS TCP® requests to EIA-485 network**

By checking this box, all MODBUS TCP® communications received over Ethernet will be sent to the EIA-485 network. This allows communication between the PC and the entire TriStar MPPT EIA-485 network via IP. The TriStar MPPT acts as an Ethernet gateway to the 485 network. Please see topic [EIA-485 Bridging](#).



**WARNING:** All incoming requests addressed to controllers and devices that are connected (bridged) to the EIA-485 port on the TriStar MPPT will be passed both READ and WRITE MODBUS® requests without exception. Setting switch #8 on the TriStar MPPT only prevents WRITE requests to the local controller. For this reason, we do not recommend enabling internet access to systems with bridged EIA-485 networks unless extra network security measures are implemented.

## Notifications

**\*\*\*These settings only apply to the TriStar MPPT 60 model.\*\*\***

The TriStar MPPT can be configured to send Email, SMS, or SNMP trap notifications. Enter the Email server address (and your username/password for access to the server) Email and SMS notifications will be sent from. The receiver of the notification can either be a normal Email address (i.e. atk334@gmail.com) or a cell phone number @ the carrier's SMS gateway (i.e. 8885553333@vtext.com). Contact the cell phone service provider for the SMS gateway or search for the appropriate carrier gateway online.

**Note:** Although most forms of webmail are not supported as the *outgoing* SMTP server, some webmail

services will provide a POP upgrade for a small fee. A POP upgrade will enable the webmail service to be used as the outgoing TSMTPPT SMTP server.

**Note:** SSL (Secure Sockets Layer) is not supported at this time (Gmail).

For SNMP trap notifications, enter the trap receiver address and port. When satisfied with your selections, click **Next >** to set up the individual notifications.

The screenshot shows a 'Notifications' dialog box with the following fields and options:

- SMTP (outgoing email)** section:
  - SMTP server address: [text box]
  - SMTP server username: [text box]
  - Change control's current SMTP password
  - SMTP server password: [text box]
  - "To" email address: [text box]
- SNMP trap receiver address** section:
  - SNMP trap receiver address: [text box]
  - SNMP trap receiver port: [text box with value 162]

At the bottom of the dialog are four buttons: '< Back', 'Next >', 'Cancel', and 'Help'.

Figure 9. TriStar MPPT Shared Notifications Settings

### SMTP Server Address

A standard IP address which identifies the SMTP (simple mail transfer protocol) server used for sending notification Emails and SMS messages. You must have an Email account with this server to use it to send TSMTPPT notifications.

**Note:** Although most forms of webmail are not supported as the *outgoing* SMTP server, some webmail services will provide a POP upgrade for a small fee. A POP upgrade will enable the webmail service to be used as the outgoing TSMTPPT SMTP server.

**Note:** SSL (Secure Sockets Layer) is not supported at this time (Gmail).

### SMTP Server Username

To use an SMTP server, a username (and password) is required. This is the same username and password

used to log in and retrieve Email from the server.

### **"To" Email Address**

The address to which Email or SMS notifications will be sent. To send an Email notification, simply enter the recipient's Email address in this field. To send an SMS notification to a cell phone/smart phone, enter the phone number of the recipient @ the carrier's SMS gateway (i.e. 888555333@vtext.com). Each cell phone carrier has a different SMS gateway. You can usually obtain gateway information by performing an online search (or contacting the cell service provider).

### **SNMP Trap Receiver Address**

A standard IP address which identifies the computer/device to receive SNMP (simple network management protocol) traps (a.k.a. notifications).

### **SNMP Trap Receiver Port**

The software port on which the computer/device will be receiving trap notifications. Port 162 is the common default port for receiving trap notifications.

Enable, name, and configure up to four unique notifications. Specify the source device of the notification and the MODBUS® variable state which will trigger the notification. Click **Next >** to move onto the next notification. When all notifications have been configured, click **Finish** to view a **Summary** of the complete controller configuration.

Notification 1

Enable Notification 1

Name

Source of data

When the Modbus variable  becomes   V

for at least  seconds, send a notification  email  SNMP trap

After sending the notification, do not send it again  seconds.

< Back   Next >   Cancel   Help

Figure 10. TriStar MPPT Individual Notifications Settings

## Summary

After you have finished entering the configuration for the TriStar MPPT, you will return to the main Custom Setpoints Summary window where you can review the custom settings. Take a few minutes to make sure your settings are accurate.

**Recommended:** Before you program the TriStar MPPT, save the configuration file for future reference/modification.

- Click *Write to File*
- Choose a folder on the PC (or create one)
- Enter a name for the file
- Click *Save*

You are now ready to **Program the TriStar MPPT**.

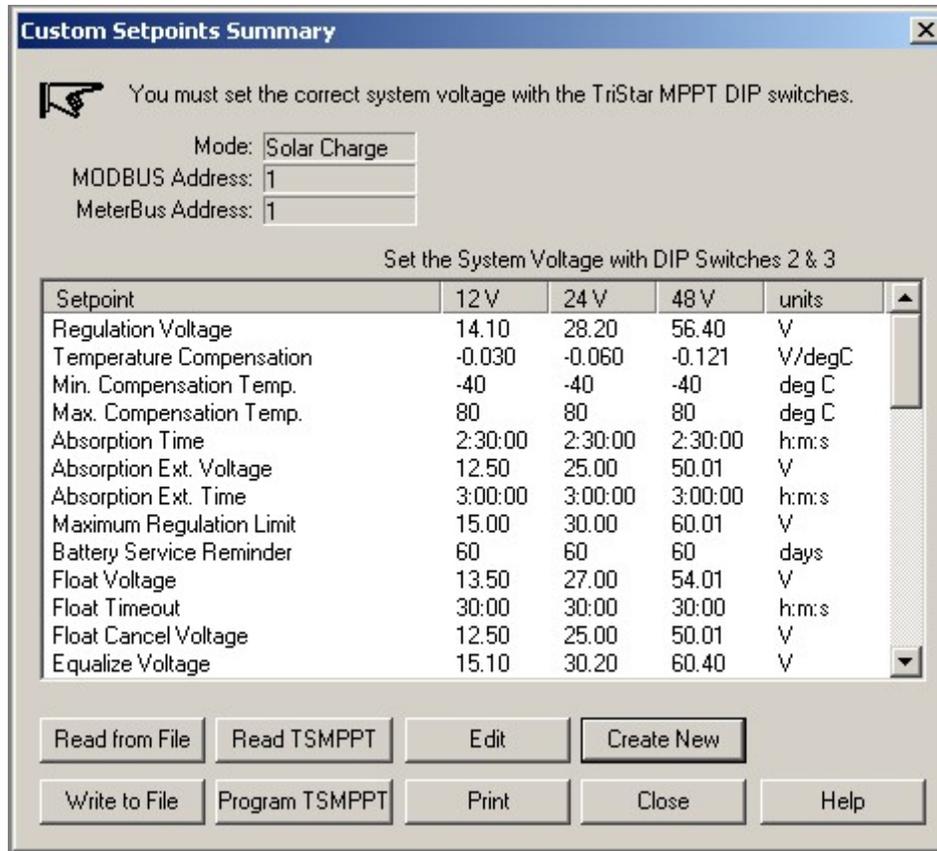


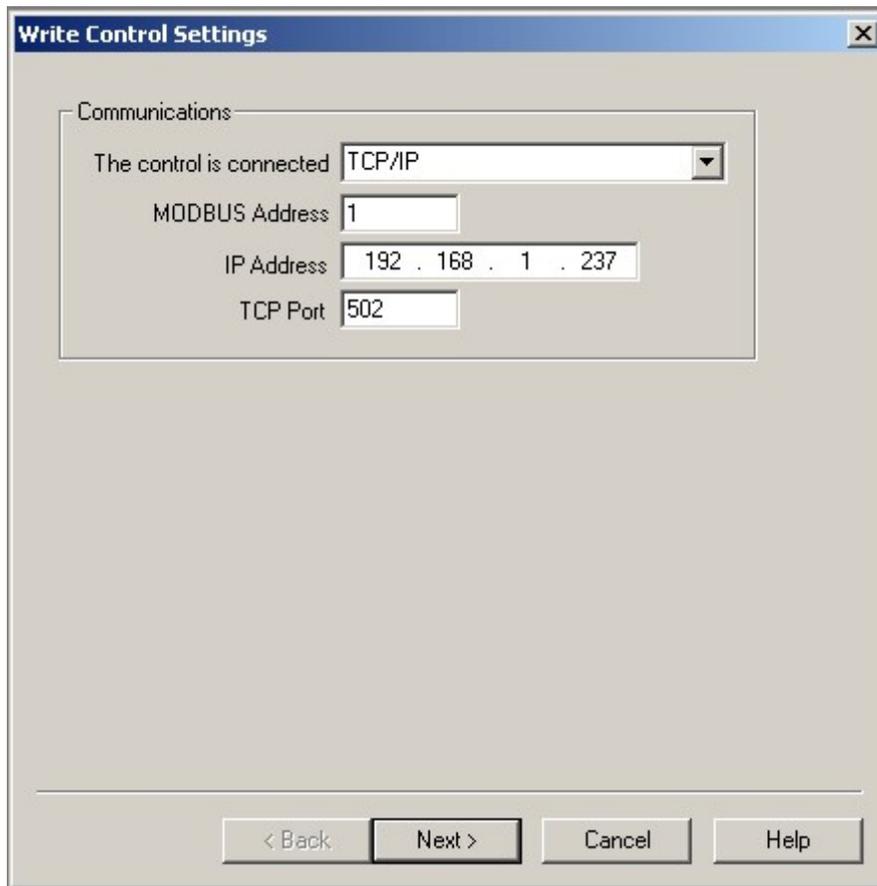
Figure 11. TriStar MPPT Custom Settings Summary

## Program the TriStar MPPT

 **IMPORTANT:** When using an RS-232 or EIA-485 connection, you must not be connected to the unit for datalogging or viewing real-time data in order to successfully program the TriStar MPPT unit. If you are using a serial connection, **disconnect** from the controller before attempting to program custom settings. (If you will be programming settings via TCP/IP, you do not need to disconnect from the controller in the main MSView screen.)

 **IMPORTANT:** The SunSaver MPPT must be powered (battery or benchtop power supply) for successful programming.

When you click on *Program TS-MPPT* on the Custom Setpoints Summary page, the following window will appear. Specify the COM port to which the TriStar MPPT is connected (or the IP address of the unit) and its MODBUS® address (default MODBUS® address for the TriStar MPPT is 1, only change this value if the default address has previously been changed). Click **Next >** when you are finished to program the unit.



The screenshot shows a dialog box titled "Write Control Settings" with a close button (X) in the top right corner. The dialog is divided into a "Communications" section and a bottom navigation area. The "Communications" section contains the following fields:

- "The control is connected" with a dropdown menu set to "TCP/IP".
- "MODBUS Address" with a text input field containing "1".
- "IP Address" with a text input field containing "192 . 168 . 1 . 237".
- "TCP Port" with a text input field containing "502".

At the bottom of the dialog, there are four buttons: "< Back", "Next >", "Cancel", and "Help".

**Figure 12. TriStar MPPT Communications Settings**

A blue status bar will appear to indicate programming is in progress.

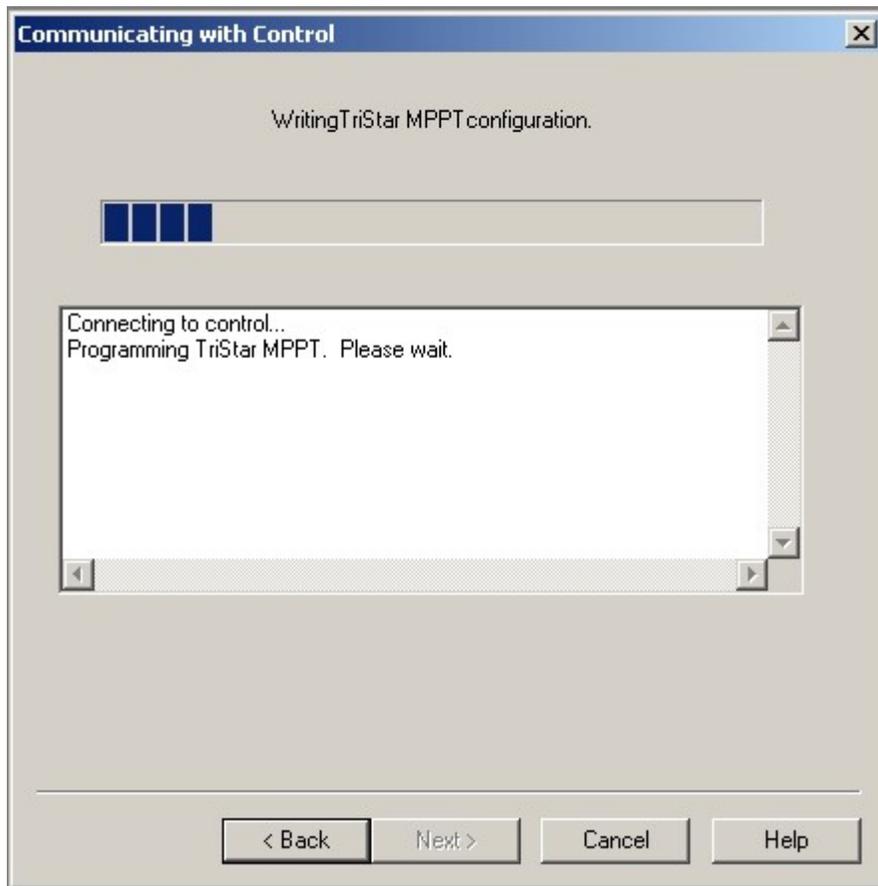


Figure 13. TriStar MPPT Programming in Progress

When programming is complete, the message "TriStar MPPT programming completed successfully" will appear in the status box. (If you are having problems programming the unit, see [Troubleshooting](#) for more information.) Click **Finish**.

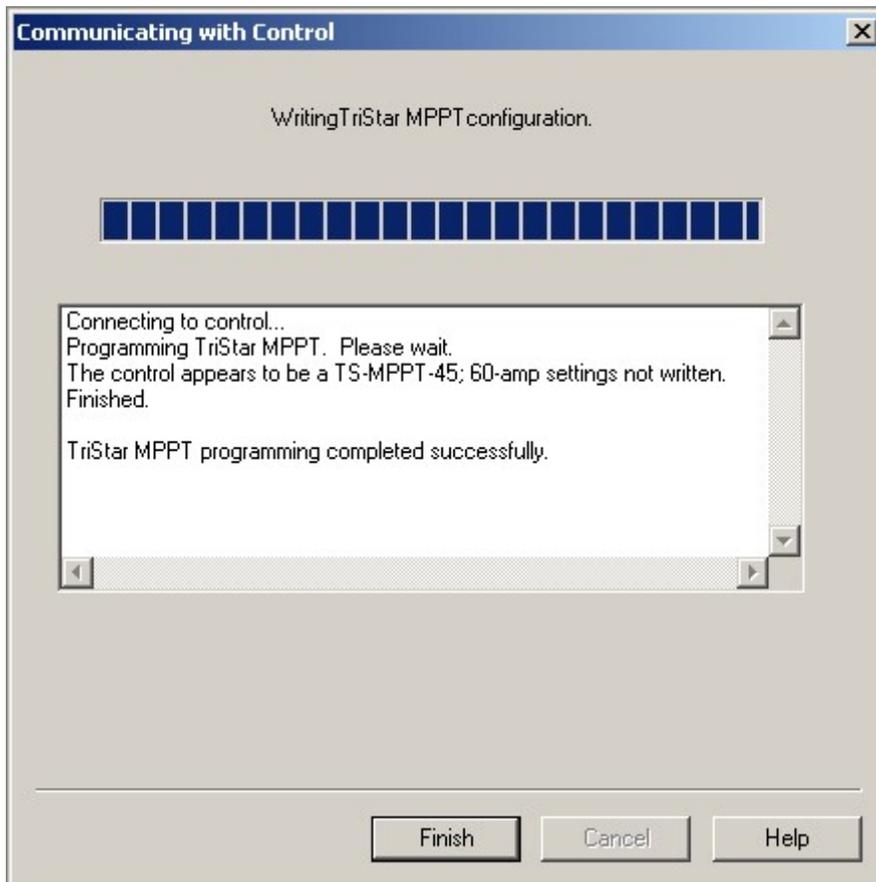


Figure 14. TriStar MPPT Programming Complete



**IMPORTANT:** After programming, the SunSaver MPPT needs to be reset for the new settings to take effect. Either disconnect battery power from the unit, wait a minute, then reapply power *OR* use the **Reset Control** command while connected to the unit.