

## Specifications:

	EC-10, EC-10M	EC-20, EC-20M	EC-30, EC-30M
Nominal Battery Voltage	12/24 V	12/24 V	12/24 V
Max. PV Open-Circuit Voltage	60 V	60 V	60 V
Maximum Battery Charging Current	10 A	20 A	30 A
Rated Load Current	10 A	20 A	30 A



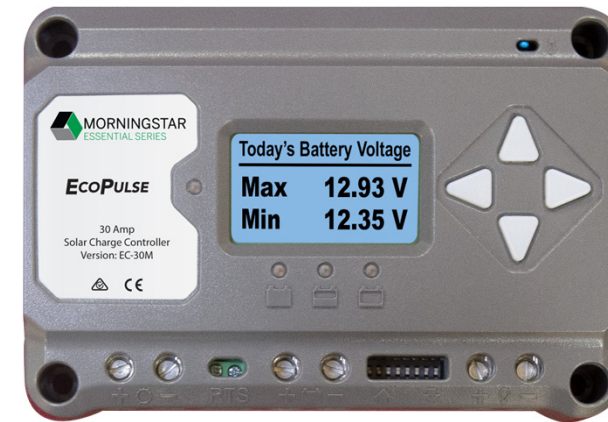
### Warning: Shock Hazard

Test between all terminals and ground before touching.

Power or accessory terminals are **NOT** electrically isolated from DC input and **may be energized with hazardous solar voltage.**

# MORNINGSTAR ESSENTIALSERIES

Worlds Leading Solar Controllers & Inverters



Metered version shown.

### Models:

- EC-10
- EC-20
- EC-30
- EC-10M
- EC-20M
- EC-30M

For 12-volt and 24-volt systems

Scan the QR Code to go directly to the EcoPulse Installation Manual and warranty information online.



Warranty Registration: <https://www.morningstarcorp.com/product-registration/>

# EcoPulse™ Solar Charging System Controller

## Quick Start Guide

### Safety Information:



#### Warning: Shock Hazard

The EcoPulse controller must be installed by a **qualified** technician in accordance with the electrical regulations of the country of installation.



#### Warning: Shock Hazard

This unit is not provided with a GFDI device. This charge controller must be used with an external GFDI device as required by the Article 690 of the National Electrical Code for the installation location.

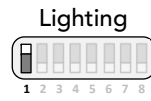
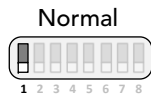


**IMPORTANT:** READ the EcoPulse Installation Manual for safety and regulatory information, instructions on configuration and operation, and warranty information.

### Operational Configuration:

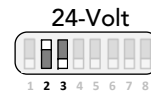
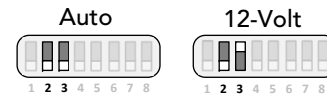
#### Switch 1: Load/Lighting

Mode	Switch 1
Normal	OFF
Lighting	ON



#### Switches 2 & 3: System Voltage

System Voltage	Switch 2	Switch 3
Auto	OFF	OFF
12	OFF	ON
24	ON	OFF



#### Switches 4, 5, & 6: Battery Type Selection

**NOTE:** The EcoPulse (metered models only) can be programmed to accommodate a wide range of charging parameters. Consult the battery manufacturer for optimal battery charging settings.

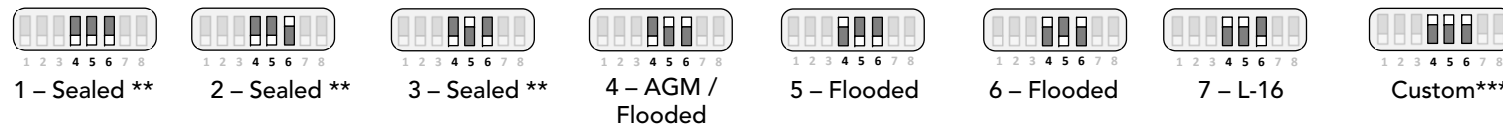
#### To set select pre-configured settings (all models):

- Configure DIP Switches 4, 5, and 6 to one of the pre-configured selections shown below.

#### To select customized settings (metered versions only):

- Set DIP Switches 4, 5, and 6 to Custom and use the interface on the meter to configure the settings.

See the EcoPulse Installation, Operations, and Maintenance Manual for additional information/guidance.



DIP Switch Setting			Battery Type	Absorption Stage (Volts)*	Float Stage (Volts)*	Equalize Stage (Volts)*	Absorption Time (Minutes)	Equalize Time (Minutes)	Equalize Timeout (Minutes)	Equalize Interval (days)	LVD (Volts)	LVR (Volts)
4	5	6										
OFF	OFF	OFF	1 – Sealed**	14.00	13.50	---	150	---	---	---	11.5	12.6
OFF	OFF	ON	2 – Sealed**	14.15	13.50	14.40	150	60	120	28	11.3	12.8
OFF	ON	OFF	3 – Sealed**	14.30	13.50	14.60	150	60	120	28	11.5	13.0
OFF	ON	ON	4 – AGM / Flooded	14.40	13.50	15.10	180	120	180	28	11.7	13.2
ON	OFF	OFF	5 – Flooded	14.60	13.50	15.30	180	120	180	28	11.9	13.4
ON	OFF	ON	6 – Flooded	14.70	13.50	15.40	180	180	240	28	12.1	13.6
ON	ON	OFF	7 – L-16	15.40	13.40	16.00	180	180	240	14	12.3	13.8
ON	ON	ON	8 – Custom***	Custom	Custom	Custom	Custom	Custom	Custom	Custom	Custom	Custom

\* Multiply the voltage by 2 for 24-volt systems.

**NOTE:** The EcoPulse settings are not compatible with Lithium-ion batteries.

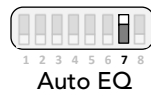
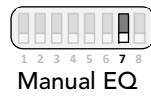
\*\* "Sealed" battery types include Gel and AGM Batteries

\*\*\* Custom settings can be used for lead-acid batteries

Shared Settings		Set Point	Shared Settings		Set Point
Absorption Extension Voltage		12.50 Volts *	Float Cancel Voltage		12.10 Volts *
Absorption Extension Time		Absorption Time +30 minutes	Equalize Time-Out		Equalize Time +60 minutes
Float Exit Time-Out		30 minutes	Temperature Compensation Co-Efficient		-30 millivolts / °C / 12 Volts *

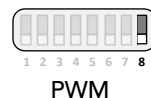
#### Switch 7: Battery Equalization

Mode	Switch 7
Manual Equalization	OFF
Auto-Equalization	ON



#### Switch 8: Current Switching

Mode	Switch 8
PWM Switching	OFF
Slow Switching	ON



**NOTE:** Regardless of DIP 7 setting, manual EQ can be initiated using the on-board meter command, **Start Equalize**. For non-meter versions, DIP 7 only enables or disables auto equalization; manual EQ is not available.

### Contact Information:

**Technical Support:** [Support.morningstarcorp.com](mailto:Support.morningstarcorp.com)  
Phone: 1-215-321-4457



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EN 62109-1

### In the Box:



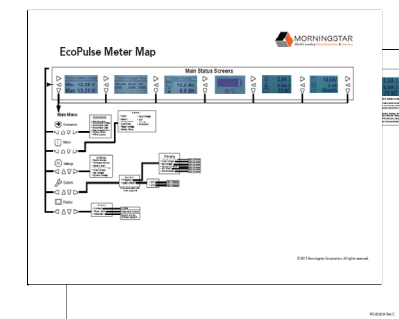
OR



EcoPulse™  
Charge Controller  
(with Meter)

EcoPulse™  
Charge Controller  
(without Meter)

#8 Self-Tapping  
Mounting Screws (x4)



Menu Map (2 pages)

### Optional Accessory:



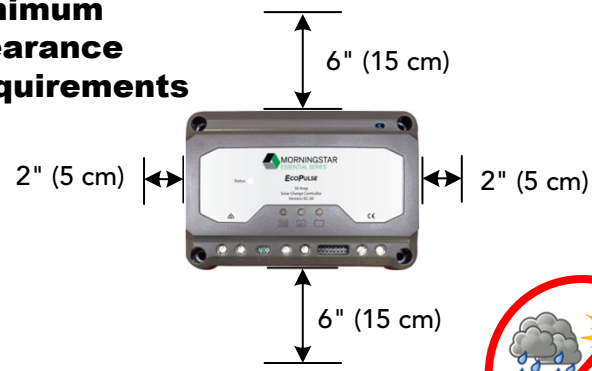
Remote  
Temperature Sensor  
(RTS)

### Tools Required:

- #2 Philips Screwdriver
- Mini-screwdriver for RTS Screws and DIP Switch Adjustments
- Drill with a 1/8" (3 mm) bit
- Multimeter



## Minimum Clearance Requirements



### Caution: Equipment Damage

Do not expose the EcoPulse to weather. Locate in a dry, protected area to prevent equipment damage.

Ensure the minimum clearance requirements are followed to provide adequate ventilation and prevent the unit from overheating.

### WARNING: Explosion Hazard

Never install the EcoPulse in an enclosure with vented/flooded batteries. Battery fumes are flammable and will corrode and destroy the EcoPulse circuits. Ensure sufficient ventilation.

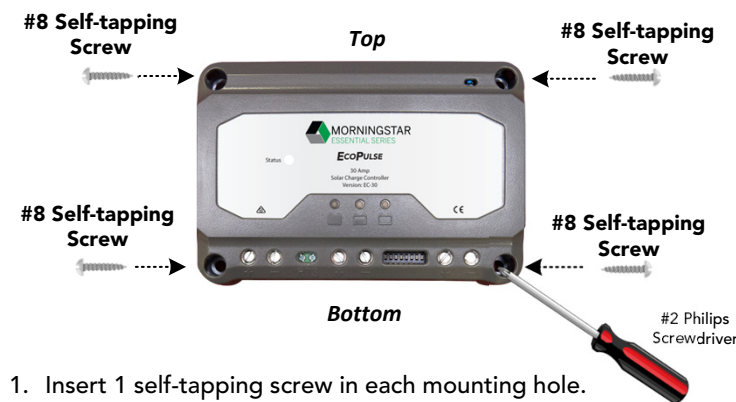
## Mounting:

### IMPORTANT:

Mount in the orientation shown here with the heat sink fins vertical.

### WARNING: Risk of Fire

Do not install over an easily combustible surface, the heat sink may get hot under certain operating conditions.



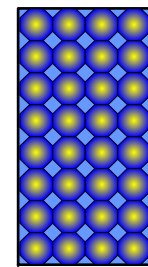
1. Insert 1 self-tapping screw in each mounting hole.
2. Tighten each screw just enough to hold the EcoPulse in place.

**IMPORTANT:** Do NOT over tighten.

## Photovoltaic (PV) Array

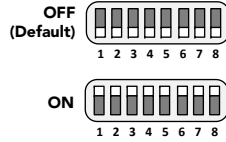
See the Morningstar PV String Calculator at: <http://string-calculator.morningstarcorp.com/>

**IMPORTANT:** Do NOT exceed 60 Voc.



### DIP Switch Block (enlargement)

(See Page 4 for settings)



### Solar Disconnect<sup>1</sup>

(PV GFP required per NEC 690)

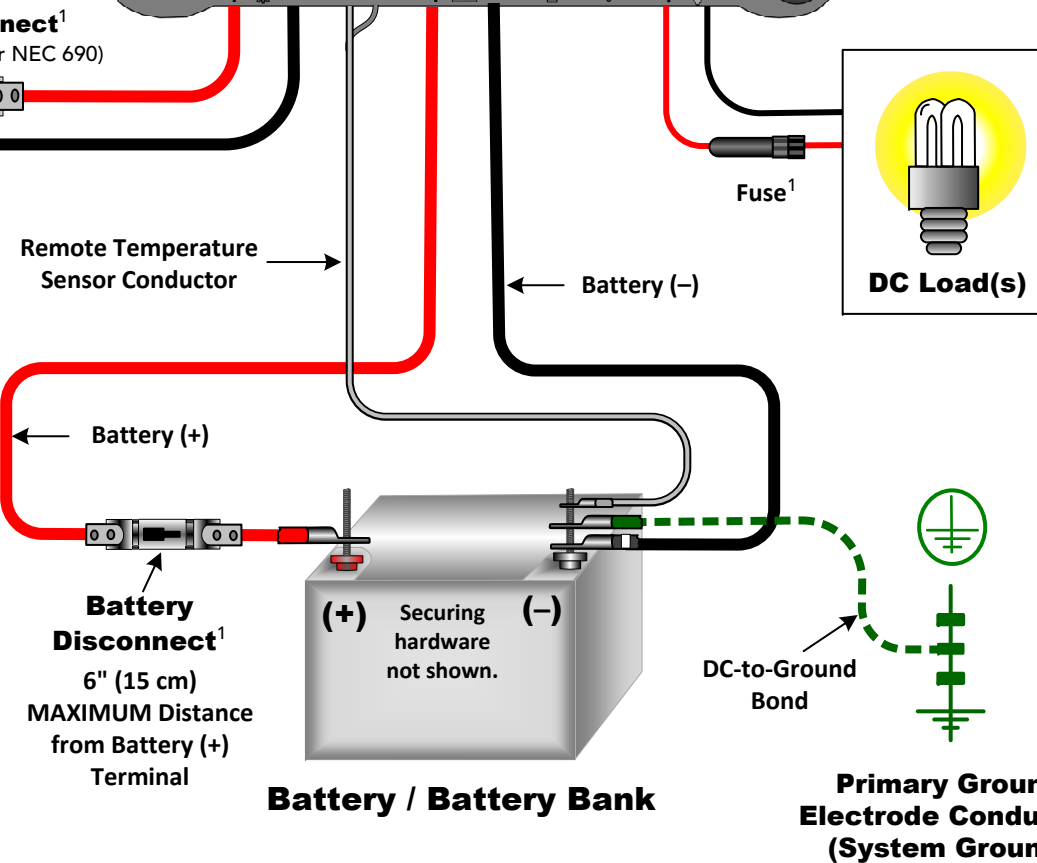
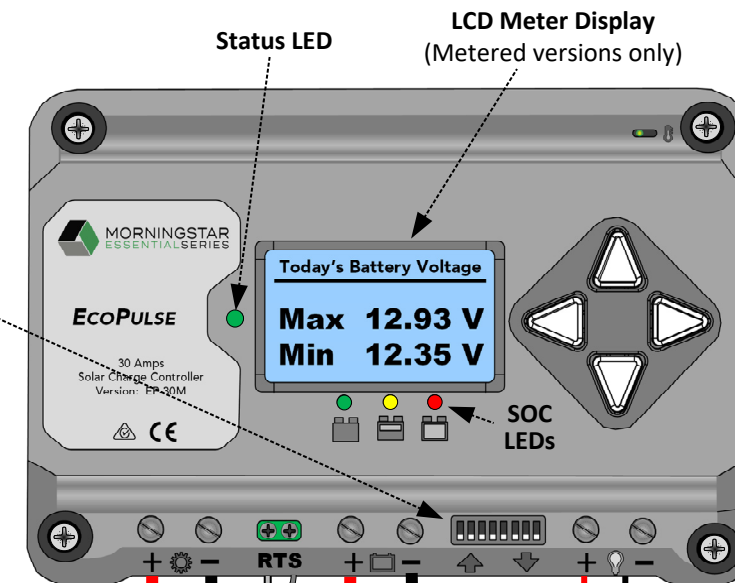
LEGEND	
	Negative (-)
	Positive (+)
	Ground

### WARNING: Hazardous Voltage

The solar PV array can produce open-circuit voltages of up to 60 Vdc when in sunlight. Verify that the solar input breaker or disconnect has been opened (disconnected) before installing the system wires.

**IMPORTANT:** Ensure there is only 1 DC Negative-to-Ground Bond in the entire system.

Wiring and Torque Requirements			
Component	Wire Size	Tool Required	Torque (Max)
Power Terminals	2.5 - 16 mm <sup>2</sup> / #14 - 6 AWG	3/16" (5 mm) Flathead Screwdriver	35 in-lbs. (3.9 Nm)
Remote Temperature Sensor	(included)	3/32" (2.5 mm) Flathead Screwdriver	5 in-lbs. (0.56 Nm)



### WARNING: Risk of Fire

All over-current protection devices and wiring must be sized properly, in accordance with US National Electric Code (NEC) or the country of installation's local regulations. Fuses or circuit breakers must be sized according to wire ampacity.

**IMPORTANT:** Example only. Actual wiring may vary. **READ the EcoPulse Installation, Operations, and Maintenance Manual for mandatory safety requirements.** All configurations must comply with local and national electric codes. Consult your local electric authority to ensure compliance.

This illustration represents a typical off-grid installation. For use with an inverter, refer to the inverter's installation manual for additional information.

## LED Indicators Key:

	G = Green	G - Y - R = flashing sequentially
	Y = Yellow	G / Y = flashing together
	R = Red	G / Y - R = G and Y flashing together, alternating with R flash

## Power Up LED Sequence:

LED Sequence	Indication
1	Status LED flashes <b>G</b>
2	SOC LEDs flash <b>G - Y - R</b> ,
3	SOC LEDs indicate battery charge status with a single battery status LED

## Status LED:

Color	Indication	Operating State
None	Off (with heartbeat)	Night
Green	On Solid (with heartbeat)	Charging
Red	Flashing	Error
Red	On Solid (with heartbeat)	Critical Error

## Battery State-of-Charge (SOC) LEDs:

Condition	Indication
Absorption	<b>G</b> Flash - every second
Float	<b>G</b> Flash - every 2 seconds
Equalize	<b>G</b> Flash - 2 per second
Low-Voltage Disconnect (LVD) Warning	<b>R</b> Flash - every second
Low-Voltage Disconnect (LVD)	<b>R</b> Solid

## Power UP Sequence:

1. Connect Battery/Battery Bank.
2. Connect Solar.

## Power DOWN Sequence:

1. Disconnect Solar.
2. Disconnect Battery/Battery Bank.