



## Photovoltaic Module Kit with Battery Back-up

Solar remote power source for harsh and hazardous environments.

# Photovoltaic Module Kit with Battery Back-up

***The problem that never happens. That's the goal behind ESP - smarter, more powerful solutions enhancing safety and productivity in your world.***

For years, solar panels have enabled users to power instrumentation and equipment in remote applications. Today, this technology is being coupled with Cooper Crouse-Hinds® Wireless Solutions so you can monitor and control processes or equipment without making a significant investment in power infrastructure.

Imagine the possibility of acquiring the information you need wirelessly after spending a few hours to install these kits in the field. Not only will you eliminate weeks of work to install power, you will also enhance your ability to monitor each location while minimizing maintenance costs.

Our systems have been tailored to power your wireless needs in any location across the globe. However, these systems can be used for remote power needs for non-wireless applications as well.

## **Solar panels are a perfect example of Cooper Crouse-Hinds innovation.**

Cooper Crouse-Hinds solar kits provide reliable power in remote applications, eliminating expensive utility power investments. These systems are pre-wired per the National Electrical Code (NEC®) and Canadian Electrical Code (CEC®) to minimize installation time and wiring errors. Solar kits are installed in weatherproof enclosures to withstand harsh weather conditions (such as rain, dust, ice, etc.) and high wind loads.

Pre-configured systems can be selected to minimize purchasing and specification efforts, and they are constructed from quality components to maximize reliability and system life.



Photo courtesy of BP Solar.

## **Solar Panel Benefits**

### **Enhance safety and productivity**

- Supply power to monitor remote assets and their locations to improve emergency response time and eliminate time-consuming, on-site inspection
- Solar power is a mature technology which has been used for over 30 years in many applications requiring safe/reliable power sources

### **Reduce operation and labor costs**

- Eliminate the need for conduit, cables, cable tray, and the necessary infrastructure involved in developing grid power in remote applications
- Pre-wired kits allow for quick installation by any qualified electrician
- Long, maintenance-free battery life (4 - 6 years) eliminates the need for frequent battery replacement

### **Reliable performance in any environment**

- Recommended temperature range: -30°C to 50°C (consult factory for more extreme temperatures)
- Class I, Division 2 assemblies available

## Certifications & Compliances

### Solar Panel

- **FM Certified:**
  - Class I, Division 2, Groups A, B, C, D

### Regulator

- **UL Listed:**
  - UL 1604
- **FM Certified:**
  - Class I, Division 2, Groups A, B, C, D
  - CSA 22.2 No. 213-M1987

### Enclosure

- **UL Listed:**
  - UL 508A, NEMA 3R (standard)
  - NEMA 4 and 4X options available

### Circuit Protection

- **UL Listed:**
  - UL 489, UL 1077
- **FM Certified (for Div. 2 version):**
  - Units < 10A: Class I, Division 2, Groups A, B, C, D, T6
  - Units ≥ 10A: Class I, Division 2, Groups A, B, C, D, T4A

### Battery

- **UL Listed:**
  - UL 1989

## Applications

- Installed with devices and equipment in remote locations (e.g. wireless radios), offering added flexibility for applications requiring DC power
- Especially well suited for sunny locations
- Obstruction lighting; instrumentation; cathodic protection; navigational aids; seismic monitoring; video surveillance; irrigation monitoring and control; telecommunications; tank and well level monitors; flow meters

## Standard Materials

- **PV module (solar panel)** – clear anodized aluminum frame, potted or terminal-type junction box, high transmission 1/8" thick tempered glass front with white polyester back and EVA (ethylene vinyl acetate) encapsulant
- **Enclosure** – aluminum NEMA 3R standard
  - painted sheet steel NEMA 4 (optional)
  - 316 stainless steel NEMA 4X (optional)

## Electrical Ratings

- 0-20A, 12VDC (consult factory for applications above 20A) (see Table 1 on page 6 for Amp-hours / day limitations for each system)
- Regulator prevents the battery from deep discharging by disconnecting the battery at 11.5V and re-connecting the battery at 12.5V

## Dimensions and Weights

Dimensions and weights are dependent on load requirements and duty cycles. Please consult factory for specific applications.



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## PV Module (Solar Panel)

Cooper Crouse-Hinds solar panels are made of high efficiency polycrystalline silicon modules - durable materials capable of weathering any environment.



### Features and benefits:

- Multi-crystalline modules offer high efficiency
- Small footprint – more compact than other solar technologies
- Fully encapsulated panel resists harsh weather conditions (hail, rain, wind, etc.)
- J-version junction box with terminal connection block accepts various conduit sizes, providing ease of installation
- 25 year expected life

## Regulator

Regulators\* manage your power requirements even in the harshest conditions. Regulators are used to channel the sun's energy into your equipment when energy is needed, or to charge the battery when energy is not required.



### Features and benefits:

- Efficient and reliable solid state components
- Adjustable duty cycle for improved control
- Robust design rated for 25% overloads
- Encapsulated in epoxy potting for superior corrosion resistance
- Marine rated terminals/anodized case provides corrosion resistance
- Temperature compensation provides reliable power supply at extreme temperatures
- Green charging/red low voltage disconnect (LVD) indicators help expedite troubleshooting

\*Note: for radio-ready solar panel assemblies, regulators are not provided as a separate component. D2 W MIO radios are equipped with integral regulators.

## Enclosure

Cooper Crouse-Hinds enclosures are specifically designed to protect your solar kit components and equipment from the elements (wind, rain, snow, debris, etc.). These enclosures can be used with the Division 2 certified components listed in the brochure to meet the needs of Division 2 rated locations.



### Features and benefits:

- Corrosion resistant enclosures house all electrical components (battery/regulator/wiring), improve system reliability, and minimize maintenance
- Enclosures include mounting features, offering several different mounting options (poles, walls, or other structures)
- Enclosures have latches to ensure the door is sealed effectively and can be padlocked for tamper resistance

## Circuit Protection

These components will ensure the protection and integrity of your equipment in the field. FM approved circuit protectors are available for use in Division 2 hazardous applications.



### Features and benefits

- Compact DIN rail mounted design
- 100 Megaohm insulation resistance for complete protection of internal components
- Sound, proven, and reliable design
- Custom configuration offers flexibility to meet a wide variety of needs

## Battery

Cooper Crouse-Hinds batteries supply the load when sunlight decreases at night. Each system can be designed to provide as many days of back-up power that your application requires. Batteries have been selected to support the repeated loading and unloading cycles encountered in solar power systems.



### Features and benefits:

- Battery is designed for maintenance-free deep cycling solar applications
- Low stand loss minimizes deterioration between transport and storage
- Tank formed plates ensure that cells have equal voltages
- Non-spillable ICAO, IATA, and DOT ratings ensure safe transport without the need for special containers
- Wireless radio can detect and send a low battery status



## Ordering Information Example (see next page for pre-configured kits)

	<b>SOL</b>	<b>30W</b>	<b>12V</b>	<b>48</b>	<b>NR</b>	<b>3R</b>	<b>2</b>
1. Solar - <b>SOL</b> _____	_____	_____	_____	_____	_____	_____	_____
2. Panel Size: <b>5W</b> (5 Watt Photovoltaic Module) <b>20W</b> (20 Watt Photovoltaic Module) <b>30W</b> (30 Watt Photovoltaic Module) _____ <b>40W</b> (40 Watt Photovoltaic Module) <b>50W</b> (50 Watt Photovoltaic Module) <b>65W</b> (65 Watt Photovoltaic Module) <b>75W</b> (75 Watt Photovoltaic Module) <b>80W</b> (80 Watt Photovoltaic Module)	_____	_____	_____	_____	_____	_____	_____
3. Battery: <b>12V</b> (12 Volt Gelled Electrolyte Battery) _____	_____	_____	_____	_____	_____	_____	_____
4. Battery Storage Capacity Rating: <b>7</b> (7.2 Amp-hour Rated Battery at c/100 hr rate to 1.75 VPC) <b>36</b> (36 Amp-hour Rated Battery c/100 hr rate to 1.75 VPC) <b>48</b> (48 Amp-hour Rated Battery c/100 hr rate to 1.75 VPC) _____ <b>70</b> (70 Amp-hour Rated Battery c/100 hr rate to 1.75 VPC) <b>99</b> (99 Amp-hour Rated Battery c/100 hr rate to 1.75 VPC)	_____	_____	_____	_____	_____	_____	_____
5. Regulator: <b>WR</b> (with Regulator) <b>NR</b> (without Regulator) (Regulator not required for solar panels rated 30 Watts or less to power D2 W MIO radios only). Radio performs regulator function. _____	_____	_____	_____	_____	_____	_____	_____
6. Enclosure Type: <b>3R</b> (NEMA 3R Enclosure**) _____	_____	_____	_____	_____	_____	_____	_____
7. Circuit Protector: <b>Blank</b> (Circuit Breakers Suitable for Ordinary Locations) <b>2</b> (Division 2 Circuit Protector) _____	_____	_____	_____	_____	_____	_____	_____

\*\*Enclosures suitable for other environments available upon request. Surge protection also available upon request.

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## Selecting a System

Determine the installation location, the load you wish to supply, and its duty cycle (what percentage of the time you wish to apply the load) following the three simple steps below:

- 1) Use the map on page 7 (see Figure 1) to select the equivalent sun hours in your area.
- 2) Determine the load requirements for your application in Amp-hours / day. For wireless applications, determine the power of your device in amps (Cooper Crouse-Hinds wireless radio power consumption can be determined using the steps found on the following website):  
<http://www.crouse-hinds.com/wirelessIO/Calculator/Files/CCHSolarCalc.xls>
  - Determine the duty cycle (i.e. 100% for continuous vs. 50% for 12 hours per day) of your load.
  - Adjust for a 1.2 Service Factor to account load requirement variability.
- 3) Select the solar kit capable of meeting or exceeding the load requirements (in Amp-hours / day) for your application. Please consult factory for higher load requirements.

### Amp-Hours / Day Calculation:

**Load requirement (Amp-hours / day) = (amps of device x duty cycle x Service Factor) x 24 hours / day**

#### Example:

16.5 mA device, continuous duty cycle, temperature = 10°C (50°F)

Load requirement = (16.5 mA x 100% x 1.2) x 24 hours / day = 475 mA-hr / day

Load requirement = 0.475 Amp-hours / day

## Pre-configured Solar Kits - Ordering Information

Please consult factory for higher load requirements

Solar Kit Cat. No.	Equivalent Sun Hours				
	2	3	4	5	6
SOL 5W 12V 7 WR 3R	0.54 / 10.30	0.81 / 6.90	1.08 / 5.18	1.35 / 4.10	1.62 / 3.40
SOL 20W 12V 36 NR 3R*	2.38 / 12.10	3.57 / 8.10	4.76 / 6.10	5.95 / 4.80	7.14 / 4.10
SOL 20W 12V 48 NR 3R*	2.38 / 16.10	3.57 / 10.80	4.76 / 8.10	5.95 / 6.50	7.14 / 5.40
SOL 30W 12V 36 NR 3R*	3.56 / 8.10	5.34 / 5.40	7.12 / 4.10	8.90 / 3.30	10.68 / 2.70
SOL 30W 12V 48 NR 3R*	3.56 / 10.80	5.34 / 7.20	7.12 / 5.40	8.90 / 4.30	10.68 / 3.50
SOL 30W 12V 70 NR 3R*	3.56 / 15.70	5.34 / 10.50	7.12 / 7.80	8.90 / 6.30	10.68 / 5.20
SOL 40W 12V 36 WR 3R	4.60 / 6.30	6.90 / 4.20	9.20 / 3.10	11.50 / 2.50	13.8 / 2.00
SOL 40W 12V 48 WR 3R	4.60 / 8.30	6.90 / 5.60	9.20 / 4.20	11.50 / 3.40	13.80 / 2.80
SOL 40W 12V 70 WR 3R	4.60 / 12.20	6.90 / 8.10	9.20 / 6.00	11.50 / 4.80	13.80 / 4.00
SOL 50W 12V 48 WR 3R	5.80 / 6.60	8.70 / 4.40	11.60 / 3.30	14.50 / 2.60	17.40 / 2.20
SOL 50W 12V 70 WR 3R	5.80 / 9.60	8.70 / 6.40	11.60 / 4.80	14.50 / 3.80	17.40 / 3.20
SOL 65W 12V 48 WR 3R	7.38 / 5.20	11.07 / 3.30	14.76 / 2.60	18.45 / 2.00	22.14 / 1.70
SOL 75W 12V 70 WR 3R	8.60 / 6.50	12.90 / 4.30	17.20 / 3.30	21.50 / 2.60	25.80 / 2.10
SOL 80W 12V 99 WR 3R	9.00 / 8.80	13.50 / 5.90	18.00 / 4.40	22.50 / 3.50	27.0 / 2.90

\*Note: regulators not included. Solar kit is intended for use with D2 W MIO radio which has a built-in regulator suitable for ≤30W solar panels and for batteries up to 100 Ahr. Please consult factory for custom designs, or for applications involving other types of equipment (additional Amp-hours / day production, additional days of autonomy, etc.).

#### KEY

■ System production in Amp-hours / day at 12VDC

■ Days of autonomy of the solar kit (days the battery can provide power to specified load)

**Table 1. System Production for Various Insolation Regions**



Insolation map courtesy of BP Solar.

\*\*Please consult Cooper Crouse-Hinds for insolation maps of additional continents.

Figure 1. Insolation Map

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If further assistance is required, please contact an authorized Cooper Crouse-Hinds Distributor, Sales Office, or Customer Service Department.

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