SOLAR PANEL APPLICATION GUIDE

This best practice guide assists with correct Solar Panel placement, ensuring optimum Solar Panel efficiency is achieved.

It details the best position for your Solar Panel based on the orientation of your home, for maximum exposure to the sun.

Included are popular scenarios, depicting what to expect from your Solar Panel in most situations.

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INTRODUCTION

The Automate™ Solar Panel is the ultimate set-and-forget solution for Li-ion battery powered, motorized shades. Our Li-ion powered motors require no electrical wiring and no complicated installation.

The Automate™ Solar Panel provides a cordless power solution that generates electricity with a Solar Panel located in the window behind the shade.

The custom designed Solar Panel 'harvests' direct and indirect sunlight, converts the light to electricity and continuously charges the lithium-ion batteries located inside the shade motor housing. This harvesting of sunlight provides adequate energy to power the window shade in most North American cities and towns, for all window orientations, including south facing windows.

SOLAR PANEL PLACEMENT

It's important we understand which factors affect the Solar Panel's efficiency, keeping these in mind when specifying.

Given that the Solar Panel may operate using indirect sunlight, it's important to find the best position in the window. In winter months, the Panel may not produce enough energy to keep the battery full and during the summer months, will rely on the stored battery power to regain a full charge.

There are several contributing factors that can affect the efficiency of the panel;

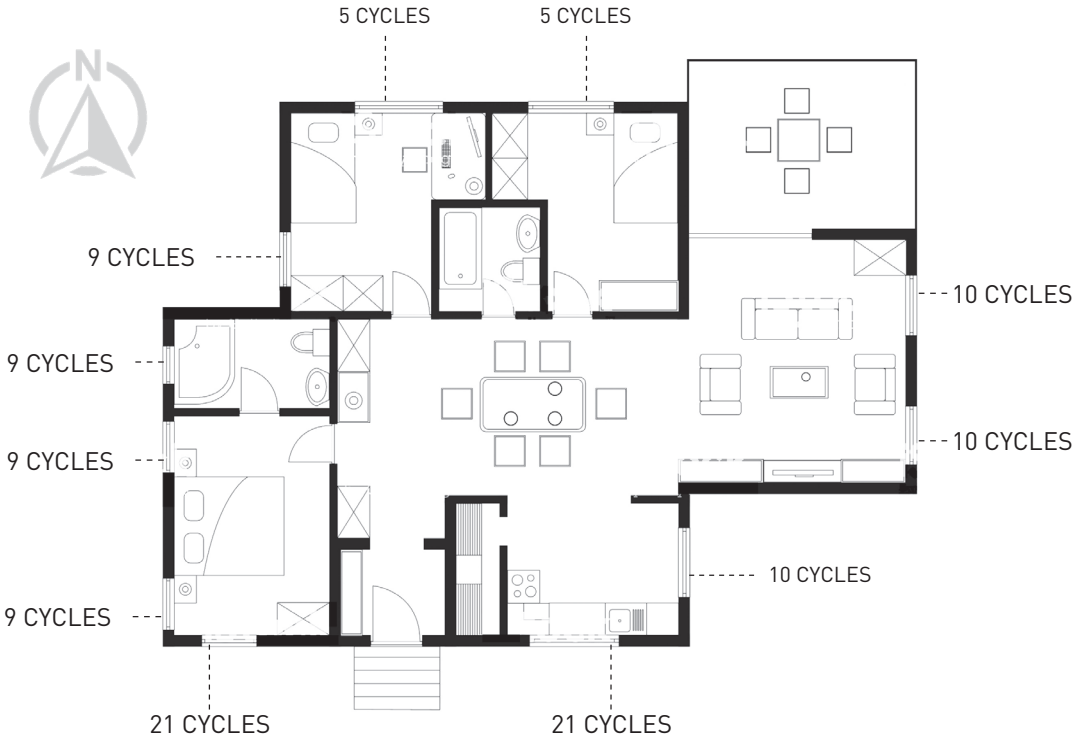
WINDOW DIRECTION

South facing windows harvest the most amount of sunlight and other facing windows estimates are noted as per below. North facing windows can generate up to 80% less energy than South facing windows.

	South	East	West	North
Window Facing Direction Effectiveness*	100%	50%	50%	20%

**Note these percentages will change depending on your latitude and city.*

The home layout example below is indicative of how many shade cycles per day, a user located in New York City can expect, based on window orientation (north, east, west or south). This is further explained in example 1 on page 6.



LIGHT TRANSMISSION

Light transmission can vary widely with the number of window panes and types of coatings. The type of glass needs to be assessed. Approximate transmission factors are:

GLASS TYPE	TRANSMISSION FACTORS
Single panel	70%
Double panel	63%
Double panel with bronze tint	30%
Double panel with selective low-e coating	45-57%

SHADOWS

We advise not to place the panel in a location partially obstructed by direct shadows such as window mullions, overhangs, or other objects that block light from striking the full area of the Panel.

Important note: The closer the shadow is to the Panel, or if a hard shadow line falls across the Panel, the effective circuit breaks and functionality of the Panel fails.

OTHER

Insect screens or other fine mesh will reduce the overall light transmission through the window assembly. Avoid these.

SHADE CYCLES PER DAY

In a residential setting, a shade is typically opened and closed 1-2 times per day. For this level of daily operation, 1 Panel should be sufficient for most shades using our Li-ion 1.1 motor. Applications calling for larger motors and more daily cycles, particularly facing south may require 2 or even 3 Solar Panels to provide continuous autonomous power throughout the year.

The total number of Solar Panels required for a specific installation will be determined by the building's location, orientation and size of shade. Cities with many sunny days will require fewer panels and cities with many cloudy days may need more.

SOLAR PANEL EXAMPLES

FOR NORTH AMERCIAN REGIONS

- The tables on pages 6-7 present 4 solar shade examples, illustrating the number of daily up/down cycles the shade can operate throughout the year, and the required number of solar panels, for selected areas.
- 50% light transmission is assumed as a worst case for all examples.

Solar radiation data based on 30-year average data published by NASA and NREL

SHADE SIZE AND WEIGHT

Fabric weight and shade length have a direct impact on daily operations. In our example calculations, we assumed the largest shade size for that motor.

Note: For Project Specific Calculations contact technical support

ACTUAL SHADE EXAMPLES

These are the cycles you can expect per day using the shade parameters below:

Example: For New York City, expect 9 cycles per day for west facing windows.

Note: 1 Cycle = 1 Up shade cycle and 1 Down shade cycle

EXAMPLE 1

	Material thickness	12 oz psy
	Shade size	84" (Wide) 84" (Drop)
	Motor type	Li-ion 1.1
	Solar Panel Charger	One
	Transparency	50%

State	City	North	South	East	West
MD	Baltimore	5	9	10	11
MT	Billings	5	25	10	10
CO	Boulder	5	21	14	14
SC	Charleston	6	17	14	14
IL	Chicago	5	19	9	9
MI	Detroit	5	18	9	8
TX	Houston	7	15	13	13
FL	Jacksonville	7	16	15	14
MO	Kansas City	5	21	11	12
CA	Los Angeles	6	19	14	15
FL	Miami	8	14	17	16
TN	Nashville	6	19	12	12
NY	New York City	5	21	10	9
PA	Philadelphia	5	20	10	10
AZ	Phoenix	7	19	17	16
ME	Portland	5	22	10	10
MO	Saint Louis	5	20	11	11
UT	Salt Lake City	5	23	11	11
CA	San Diego	6	17	15	17
CA	San Francisco	5	21	11	12
WA	Seattle	3	11	5	5

** As a rough guide, adding a second Solar Panel to your motor doubles the cycle output indicated above*

EXAMPLE 2

	Material thickness	12 oz. psy
	Shade size	96" (Wide) 96" (Drop)
	Motor type	Li-ion Q2.0
	Solar Panel Charger	One
	Transparency	50%

State	City	North	South	East	West
MD	Baltimore	2	6	3	4
MT	Billings	1	8	3	3
CO	Boulder	2	7	4	4
SC	Charleston	2	5	5	5
IL	Chicago	2	6	3	3
MI	Detroit	2	6	3	3
TX	Houston	2	5	4	4
FL	Jacksonville	2	5	5	5
MO	Kansas City	2	6	4	4
CA	Los Angeles	2	6	5	5
FL	Miami	2	4	6	5
TN	Nashville	2	6	4	4
NY	New York City	2	6	3	3
PA	Philadelphia	2	6	3	3
AZ	Phoenix	2	6	6	5
ME	Portland	1	6	3	3
MO	Saint Louis	2	6	4	4
UT	Salt Lake City	2	7	4	4
CA	San Diego	2	5	5	5
CA	San Francisco	2	7	4	4
WA	Seattle	1	4	2	2

** As a rough guide, adding a second Solar Panel to your motor doubles the cycle output indicated above*

EXAMPLE 3

	Material thickness	12 oz. psy
	Shade size	120" (Wide) 120" (Drop)
	Motor type	Li-ion Q2.0
	Solar Panel Charger	Two
	Transparency	50%

State	City	North	South	East	West
MD	Baltimore	2	8	4	4
MT	Billings	2	10	4	4
CO	Boulder	2	9	6	6
SC	Charleston	2	7	6	6
IL	Chicago	2	8	4	4
MI	Detroit	2	7	3	3
TX	Houston	3	6	5	5
FL	Jacksonville	3	6	6	6
MO	Kansas City	2	8	5	5
CA	Los Angeles	3	8	6	6
FL	Miami	3	6	7	7
TN	Nashville	2	8	5	5
NY	New York City	2	9	4	4
PA	Philadelphia	2	8	4	4
AZ	Phoenix	2	8	4	4
ME	Portland	2	9	4	4
MO	Saint Louis	2	8	5	4
UT	Salt Lake City	2	9	4	4
CA	San Diego	3	7	6	7
CA	San Francisco	2	9	4	5
WA	Seattle	1	5	2	2

** As a rough guide, adding a third Solar Panel to your motor adds 1/3 to the cycle output indicated above*

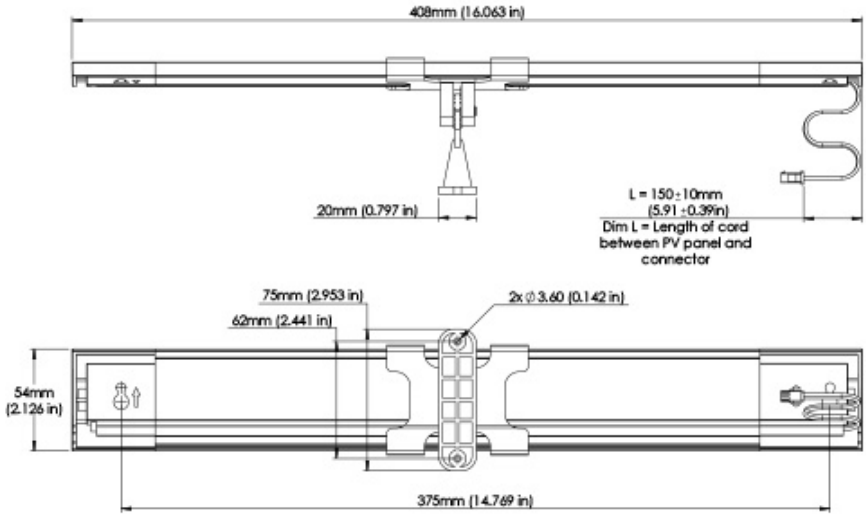
EXAMPLE 4

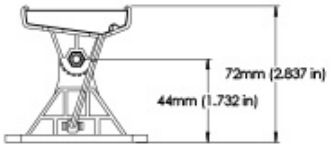
	Material thickness	12 oz. psy
	Shade size	144" (Wide) 144" (Drop)
	Motor type	Li-ion Q3
	Solar Panel Charger	Two
	Transparency	50%

State	City	North	South	East	West
MD	Baltimore	1	4	2	2
MT	Billings	1	5	2	2
CO	Boulder	1	5	3	3
SC	Charleston	1	3	3	3
IL	Chicago	1	4	2	2
MI	Detroit	1	4	2	2
TX	Houston	1	3	3	3
FL	Jacksonville	1	3	3	3
MO	Kansas City	1	4	3	3
CA	Los Angeles	1	4	3	3
FL	Miami	2	3	4	4
TN	Nashville	1	4	3	3
NY	New York City	1	4	2	2
PA	Philadelphia	1	4	2	2
AZ	Phoenix	1	4	4	4
ME	Portland	1	5	2	2
MO	Saint Louis	1	4	2	2
UT	Salt Lake City	1	5	2	2
CA	San Diego	1	4	3	4
CA	San Francisco	1	5	2	3
WA	Seattle	1	2	1	1

** As a rough guide, adding a third Solar Panel to your motor adds 1/3 to the cycle output indicated above*

SPECIFICATIONS





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