



BATTERY GUIDE

USING STAND-ALONE, DEEP-CYCLE BATTERIES

INTRODUCTION

This guide provides details on operating your ResMed device from a stand-alone, deep-cycle battery for a single night before recharging. Begin with the Getting Started section to determine your needs and identify the type of battery required for your ResMed device. The tables in this guide contain technical details relating to the battery requirements for specific types of ResMed devices. Refer to the Frequently Asked Questions section near the end of this guide for answers to your questions.

NOTE: This guide contains details for devices currently supported by ResMed. If you have an older device not listed in this guide, please contact your home medical equipment provider for assistance.

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QUICK OVERVIEW

The following overview describes selection of a deep-cycle battery suitable for operating your ResMed device for 8 hours using an appropriate ResMed **DC-to-DC converter**.

NOTE: If you plan on using a DC-to-AC inverter or need more detailed instructions, see the “Getting Started” section on the next page.

1. Obtain appropriate DC-to-DC converter for your ResMed device.



ResMed DC-to-DC converter (example)

2. Obtain a cable adapter to connect your DC-to-DC converter to a battery.



Cable adapter

3. Identify your device’s treatment pressure.
4. Go to the “Converter Battery Tables” and locate appropriate table for your device.

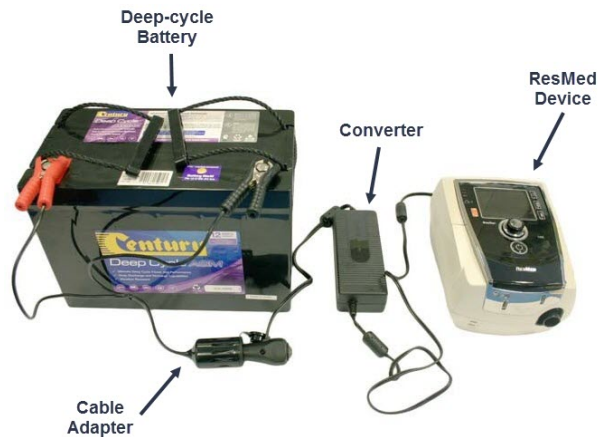
5. Locate treatment pressure (or next highest value) in table and read across to the required battery size in amp hours (AH).

Example: **AirStart 10** with a pressure of **10cmH₂O** requires a **7AH** deep-cycle battery:

Air10 series			
AirStart 10 and AirSense 10.			
Product	IPAP Pressure (cm H ₂ O)	Battery Size (AH)	Current draw @ 12 V DC (amps)
AirStart 10 + SlimLine tubing	6	5	0.39
	8	6	0.48
	10	7	0.53
	12	8	0.61

AirStart 10 DC-to-DC converter battery table

6. Assemble all the components.



Battery, cable adapter, converter, and device

GETTING STARTED

We provide two different solutions for connecting your device to a stand-alone battery. One solution uses DC-to-DC converters and the other uses DC-to-AC inverters. Before getting started, let's review some basic assumptions upon which we base our recommendations in this guide. You will:

- power your device using a stand-alone, deep-cycle battery,
- use your device for an 8-hour period,
- recharge your battery every day after use,
- use only the components we describe in this guide.

Converter or Inverter?

We strongly recommend using DC-to-DC converters to power your ResMed device from a battery rather than DC-to-AC inverters. Let's start with a couple questions to help identify which process steps to follow.

1. **Will you be able to recharge the battery daily after use?**
 - **YES** – Go to step 2
 - **NO** – Contact your home medical equipment or battery provider to discuss your options for power as this guide only applies to identifying battery sizes sufficient to power a ResMed device for 8 hours between charges. See also the “Frequently Asked Questions” at the end of this guide.
2. **Will you use a DC-to-DC converter or a DC-to-AC inverter?**
 - **Converter** – Follow the steps in the “Using a Converter” section below.
 - **Inverter** – Follow the steps in the “Using an Inverter” section later in this guide.

Using a Converter

The following questions step you through identification of the appropriate battery for use with a DC-to-DC converter to power your ResMed device.

NOTE: This section applies to the following ResMed products: AirMini, AirSolutions 10, S9, and Stellar series.

1. **Do you have an appropriate DC-to-DC converter for your ResMed device?**
 - **YES** – Go to step 2.
 - **NO** – Review the list below and contact your home medical equipment provider for the converter appropriate to your ResMed device and then go to step 2:
 - **Air10 series** – Air10 DC/DC converter (p/n 37297)
 - **AirMini series** – AirMini DC/DC converter (p/n 38839)
 - **S9 series** – DC/DC converter 24V/90W (p/n 36970)
 - **Stellar series** – Stellar DC/DC converter (p/n 24922)
2. **Do you have a cable adapter to connect your DC-to-DC converter to a battery?**
 - **YES** – Go to step 3.
 - **NO** – Obtain an appropriate cable adapter from your home medical equipment or battery provider. Go to step 3.

3. **Do you know the treatment pressure set on your device?**
 - **YES** – Go to step 4.
 - **NO** – Contact your home medical equipment or healthcare provider and request your treatment pressure then go to step 4.
4. **Go to the “Converter Battery Tables” section and locate the appropriate table for your device.**
Locate your treatment pressure (or next highest value) in the table and read across to identify the required battery size in amp hours (AH). This is the size battery you will need to operate your device for 8 hours.

Using an Inverter

While we recommend using DC-to-DC converters, if you must use a DC-to-AC inverter, you can do so with some ResMed devices. The following questions step you through identification of the appropriate battery for use with a DC-to-AC inverter to power your ResMed device. We recommend using a pure sine wave inverter with a continuous power rating of 300 watts and a peak/surge rating of 500 watts.

WARNING: We recommend only using an inverter certified by an accredited testing and certification organization, such as VDE, TSU or BSI in addition to CE markings for EU countries or UL markings for the USA.

NOTE: The steps in this section apply to the following ResMed products: S9, VPAP III, AutoSet CS2, VPAP Adapt series used with appropriate humidifiers (HumidAire 2i, H4i, or H5i only). These steps also apply to the Stellar series.

1. **Do you have a pure sine wave DC-to-AC inverter with a continuous power rating of 300 watts and a peak/surge rating of 500 watts?**
 - **YES** – Go to step 2.
 - **NO** – Contact your battery or electrical supplies provider for assistance in obtaining the appropriate type of inverter.
NOTE: The following ResMed devices **without** humidifiers can operate using a 150 watt modified sine wave inverter: VPAP III, AutoSet CS2, VPAP Adapt series. S9 series with H5i humidifiers can also operate from this inverter type.
2. **If required, do you have a cable adapter to connect your DC-to-AC inverter to a battery?**
 - **YES** – Go to step 3.
 - **NO** – Obtain an appropriate cable adapter from your home medical equipment or battery provider. Got to step 3.
3. **Do you know the treatment pressure set on your device?**
 - **YES** – Go to step 4.
 - **NO** – Contact your home medical equipment or healthcare provider and request your treatment pressure then go to step 4.
4. **Go to the Inverter “Battery Tables” section and locate the appropriate table for your device.**
Locate your treatment pressure (or next highest value) in the table and read across to identify the required battery size in amp hours (AH). This is the size battery you will need to operate your device for 8 hours.

Please be aware of the following related to use of inverters with ResMed products:

WARNING:

- Other ResMed heated humidifiers must not be used with inverters. Damage to the unit or serious injury to the user may result. If you are using another brand of heated humidifier, check with the manufacturer for their recommendation.
- The original HumidAire™ must not be used with inverters.

CAUTION: Do not use the C-Series Tango heated humidifier with an inverter. This humidifier can only be used on mains AC power, not battery power.

BATTERIES

As we mentioned earlier, this guide provides instructions for using a **stand-alone, deep-cycle battery** to power your ResMed device. To use the tables in this section, first determine if you will be using a DC-to-DC converter or a DC-to-AC inverter. Next, select the appropriate set of tables (converter or inverter) and locate the table for your ResMed device.

Once you have identified the appropriate table, locate your device within the “Product” column. There may be various entries depending on model, use of a humidifier, and tubing choice. Next, locate your pressure setting (or the next highest if yours is not listed) in the “Pressure” column. Read across the table to identify the battery size in amp hours (AH). This tells you the deep-cycle battery size you will need to power your device for 8-hours.

CAUTION:

- Match the voltage of your battery with the voltage requirement of your converter or inverter.
- Always check with the battery manufacturer for discharge rates and charging instructions. Damage to the battery may result from excessive discharge or incorrect charging.
- Always follow the battery manufacturer’s instructions for maintenance and storage of the battery.

Converter Battery Tables

This section contains a series of tables for identifying the deep-cycle battery size (in AH) required to power your ResMed device at a given treatment pressure using the appropriate ResMed DC-to-DC converter. All battery sizes are based on 8-hour usage and include a 50% safety margin. Devices in this section include:

- AirMini
- Stellar series
- Air10 series
- S9 series

CAUTION: These tables only apply to use with the appropriate ResMed DC-to-DC converter. If you will be using a DC-to-AC inverter, see the “Inverter Battery Tables” later in this guide.

AirMini

Product	Treatment Pressure (cm H ₂ O)	Battery Size (AH)	Current draw @ 12V DC (amps)
AirMini	6	4	0.37
	8	5	0.40
	10	5	0.45
	12	6	0.50
	16	8	0.63
	20	9	0.76

Stellar series

Product	IPAP Pressure (cm H ₂ O)	Battery Size (AH)	Current draw @ 12V DC (amps)
Stellar	10	8	0.66
	15	10	0.76
	20	11	0.86
	25	12	0.97
	30	14	1.11
	35	15	1.24
	40	17	1.38

Air10 series

AirStart 10 and AirSense 10.

Product	IPAP Pressure (cm H ₂ O)	Battery Size (AH)	Current draw @ 12V DC (amps)
AirStart 10 + SlimLine tubing	6	5	0.39
	8	6	0.48
	10	7	0.53
	12	8	0.61
	16	10	0.80
	20	13	1.01
AirStart 10 + SlimLine tubing, humidifier (@ 4)	6	16	1.28
	8	18	1.49
	10	20	1.66
	12	23	1.84
	16	28	2.28
	20	32	2.66
AirStart 10 + SlimLine tubing, humidifier (@ 8)	6	38	3.14
	8	40	3.31
	10	42	3.44
	12	45	3.67
	16	48	4.00
	20	53	4.34
AirSense 10 CPAP AirSense 10 Elite AirSense 10 AutoSet AirSense 10 AutoSet for Her + All above with ClimateLineAir (@ 30°C)	6	13	1.06
	8	15	1.20
	10	19	1.52
	12	24	1.96
	16	33	2.68
	20	42	3.50

Table continues in next column

Product	IPAP Pressure (cm H ₂ O)	Battery Size (AH)	Current draw @ 12V DC (amps)
AirSense 10 CPAP AirSense 10 Elite AirSense 10 AutoSet AirSense 10 AutoSet for Her + All above with SlimLine tubing	6	9	0.70
	8	10	0.79
	10	12	0.93
	12	13	1.06
	16	15	1.23
	20	20	1.66
AirSense 10 CPAP AirSense 10 Elite AirSense 10 AutoSet AirSense 10 AutoSet for Her + All above with SlimLine tubing, humidifier (@ 4)	6	21	1.73
	8	24	2.00
	10	28	2.30
	12	32	2.61
	16	40	3.33
	20	51	4.19
AirSense 10 CPAP AirSense 10 Elite AirSense 10 AutoSet AirSense 10 AutoSet for Her + All above with SlimLine tubing, humidifier (@ 8)	6	42	3.44
	8	42	3.49
	10	44	3.66
	12	47	3.86
	16	51	4.18
	20	56	4.59
AirSense 10 CPAP AirSense 10 Elite AirSense 10 AutoSet AirSense 10 AutoSet for Her + All above with ClimateLine Air tubing, humidifier (@ Auto)	6	38	3.12
	8	43	3.55
	10	46	3.77
	12	49	4.02
	16	51	4.21
	20	53	4.35
AirSense 10 CPAP AirSense 10 Elite AirSense 10 AutoSet AirSense 10 AutoSet for Her + All above with ClimateLine Air tubing (@30°C), humidifier (@ 8)	6	57	4.71
	8	58	4.77
	10	60	4.92
	12	62	5.12
	16	65	5.37
	20	68	5.61

S9 Series

Where the H5i is being used figures will vary dependent upon relative humidity.

Product	Treatment Pressure (cm H ₂ O)	Battery Size (AH)	Current draw @ 12V DC (amps)
S9 AutoSet S9 Elite S9 Escape S9 Escape Auto	6	5	0.39
	8	6	0.46
	10	7	0.55
	12	8	0.65
	16	11	0.90
	20	13	1.00
S9 AutoSet S9 Elite S9 Escape S9 Escape Auto + All above with H5i (@ 3)	6	15	1.25
	8	20	1.62
	10	25	2.03
	12	29	2.39
	16	39	3.19
	20	49	4.03
S9 AutoSet S9 Elite S9 Escape S9 Escape Auto + All above with H5i (@ 6)	6	56	4.61
	8	59	4.84
	10	60	4.99
	12	63	5.17
	16	67	5.58
	20	73	6.04
S9 AutoSet S9 Elite S9 Escape S9 Escape Auto + All above with H5i, Climate control (@ 30° C)	6	52	4.27
	8	61	5.08
	10	67	5.58
	12	70	5.77
	16	74	6.15
	20	79	6.59
IPAP pressure (cm H₂O)			
S9 VPAP S S9 VPAP ST	10	7	0.52
	15	10	0.80
	20	15	1.17
	25	19	1.57
S9 VPAP S S9 VPAP ST + All above with H5i (@ 3)	10	17	1.41
	15	23	1.90
	20	37	3.07
	25	42	3.44

Table continues in next column

Product	Treatment Pressure (cm H ₂ O)	Battery Size (AH)	Current draw @ 12V DC (amps)
IPAP pressure (cm H₂O)			
S9 VPAP S S9 VPAP ST + All above with H5i (@ 6)	10	59	4.87
	15	62	5.10
	20	72	5.95
	25	77	6.35
S9 VPAP S S9 VPAP ST + All above with H5i, Climate control (@ 30° C)	10	56	4.66
	15	69	5.69
	20	74	6.10
	25	77	6.41
EPAP pressure (cm H₂O)			
S9 VPAP S9 Adapt SV-A S9 AutoSet CS/CS-A	5	8	0.61
	10	10	0.76
	15	12	0.95
S9 VPAP S9 Adapt SV-A S9 AutoSet CS/CS-A + All above with H5i (@ 3)	5	30	2.45
	10	37	3.05
	15	45	3.75
S9 VPAP S9 Adapt SV-A S9 AutoSet CS/CS-A + All above with H5i (@ 6)	5	54	4.47
	10	63	5.24
	15	73	6.06
S9 VPAP S9 Adapt SV-A S9 AutoSet CS/CS-A + All above with H5i, Climate control (@ 30° C)	5	71	5.85
	10	77	6.35
	15	85	7.05
Max IPAP pressure (cm H₂O)			
S9 VPAP Auto	15	7	0.54
	20	9	0.75
	25	12	1.00
S9 VPAP Auto + H5i (@ 3)	15	16	1.27
	20	25	2.01
	25	28	2.26
S9 VPAP Auto + H5i (@ 6)	15	47	3.89
	20	62	5.10
	25	65	5.42
S9 VPAP Auto + H5i, Climate control (@ 30° C)	15	37	3.05
	20	52	4.29
	25	65	5.34

Inverter Battery Tables

This section contains a series of tables for identifying the deep-cycle battery size (in AH) required to power your ResMed device at a given treatment pressure using a DC-to-AC inverter. All battery sizes are based on 8-hour usage and include a 50% safety margin. Devices in this section include:

- S9 Series
- VPAP III Series
- AutoSet CS2
- VPAP Adapt
- Stellar Series

CAUTION: These tables only apply to use with a DC-to-AC inverter. If you will be using a DC-to-DC converter, see the “Converter Battery Tables” earlier in this guide.

NOTE: Automatic device treatment pressures vary—95th percentile pressure used for all AutoSet products.

S9 series

Product	Treatment Pressure (cm H ₂ O)	Battery Size (AH)	Current draw @ 12V DC (amps)
S9 Elite S9 AutoSet + All above with (EPR @ 0)	6	11	0.89
	8	12	0.95
	10	12	1.02
	12	13	1.08
	16	15	1.23
	20	17	1.41
S9 Elite S9 AutoSet + All above with H5i (EPR @ 0, H5i @ 3)	6	31	2.57
	8	33	2.76
	10	36	3.01
	12	40	3.32
	16	45	3.77
	20	49	4.10
S9 Elite S9 AutoSet + All above with H5i (EPR @ 0, H5i @ 6)	6	59	4.94
	8	65	5.45
	10	71	5.90
	12	74	6.18
	16	78	6.47
	20	80	6.69
S9 Elite S9 AutoSet + All above with H5i and Climate control (EPR @ 0, CC @ 27° C)	6	37	3.05
	8	44	3.69
	10	49	4.12
	12	54	4.48
	16	73	6.06
	20	87	7.25

Product	Treatment Pressure (cm H ₂ O)	Battery Size (AH)	Current draw @ 12V DC (amps)
S9 Elite S9 AutoSet + All above with H5i and Climate control (EPR @ 0, CC @ 30° C)	6	40	3.32
	8	45	3.78
	10	50	4.20
	12	57	4.71
	16	68	5.68
	20	78	6.49
IPAP pressure (cm H₂O)			
S9 VPAP ST-A S9 COPD	10	15	1.19
	15	16	1.29
	20	17	1.40
	25	18	1.47
	30	23	1.90
EPAP pressure (cm H₂O)			
S9 VPAP Adapt SV-A S9 AutoSet CS-A	5	20	1.66
	10	28	2.33
	15	37	3.01
S9 VPAP Adapt SV-A S9 AutoSet CS-A + All above with H5i (@ 3)	5	36	2.93
	10	43	3.53
	15	58	4.79
S9 VPAP Adapt SV-A S9 AutoSet CS-A + All above with H5i (@ 6)	5	60	4.94
	10	67	5.51
	15	84	6.95
S9 VPAP Adapt SV-A S9 AutoSet CS-A + All above with H5i, ClimateLine (@ 30°C)	5	88	7.28
	10	97	8.04
	15	108	8.94

VPAP III series

The values in the table are based on a respiratory rate of 20 breaths per minute. Power consumption (and recommended battery capacity) will increase with higher respiratory rates.

Product	IPAP Pressure (cm H ₂ O)	Battery Size (AH)	Current draw @ 12V DC (amps)
VPAP III ST-A VPAP III ST-A with QuickNav	5	20	1.65
	10	22	1.86
	15	25	2.11
	20	29	2.41
	25	33	2.76
	30	38	3.15
VPAP III ST-A VPAP III ST-A with QuickNav + All above with HumidAire 2i	5	48	4.04
	10	51	4.25
	15	54	4.49
	20	58	4.79
	25	62	5.15
	30	66	5.54

AutoSet CS2 and VPAP Adapt

Product	EEP (cm H ₂ O)	Median Pressure Support (cm H ₂ O)	Battery Size (AH)	Current draw @ 12V DC (amps)
AutoSet CS2 VPAP Adapt	4	6	23	1.88
	6	6	24	1.97
	8	6	26	2.11
	10	5	27	2.23
AutoSet CS2 VPAP Adapt + All above with H2i	4	6	56	
	6	6	57	
	8	6	58	
	10	5	60	

Stellar series

Product	IPAP Pressure (cm H ₂ O)	Battery Size (AH)	Current draw @ 12V DC (amps)
Stellar	10	16	1.25
	15	16	1.27
	20	18	1.42
	25	20	1.59
	30	22	1.77
	35	27	2.21
Stellar + H4i (@ 4)	40	30	2.47
	10	87	7.21
	15	94	7.79
	20	103	8.57
	25	112	9.31
	30	127	10.55
	35	142	11.82
	40	150	12.49

FREQUENTLY ASKED QUESTIONS

Find help with the following questions and answers. For questions not answered in this guide, please contact your home medical equipment or battery provider.

Must I use a stand-alone battery to power my ResMed device?

You can use a ResMed DC-to-DC converter to connect your device to the DC power receptacle of an operating vehicle such as a car, boat, or RV. As long as the vehicle remains operating, the vehicle's battery will continue to charge. Powering your device from a non-operating vehicle may discharge the vehicle's battery resulting in damage to the battery. For times when the vehicle will not be operating, we recommend using a separate, stand-alone, deep-cycle battery to power your device. **WARNING:** Do not attempt to start the vehicle engine while using your ResMed device powered from the vehicle battery. Dangerous voltage spikes may damage the device.

What type of battery should I get?

We recommend using a deep-cycle battery to power your device outside of an operating vehicle. Determine the battery size (rated in amp-hours or AH) necessary for your specific device using the charts in the "Batteries" section of this guide.

Can I use a stand-alone car battery to power my device?

No. This guide provides information about powering ResMed devices using deep-cycle batteries rated at specific amp-hours (AH). Automotive batteries are designed to be continually charged and deep discharges (as would occur when using the battery by itself) significantly decrease the life of the battery. Further, automotive batteries are rated in cold cranking amps (CCA) which is not equivalent to the AH ratings of deep-cycle batteries.

Where do I get a battery?

You can purchase a battery from camping stores or other retailers who offer deep-cycle batteries of sufficient size to meet the power needs of your ResMed device.

What is a deep-cycle battery?

Deep-cycle batteries use thick lead plates in each cell of the battery and can regularly experience deep discharges of 80% or more before recharging. Deep-cycle batteries are rated (or sized) in amp hours (AH). This is the "battery size" value we list in our tables.

What is a marine battery?

Marine batteries are similar to, but not true deep-cycle batteries. Like deep-cycle batteries, marine batteries are rated (or sized) in amp hours but generally should not be discharged beyond 60% before recharging.

What are amp hours?

Amp hours (AH) describe the "size" or capability of a battery. The AH rating defines the current that can be drawn from the battery for a specified time. For example, a battery rated at 50 AH can supply 1 amp for 50 hours, or 2 amps for 25 hours and so on. This only works up to a point, as there are constraints on the maximum performance.

Are cold cranking amps the same as amp hours?

No. Cold cranking amps (CCA) describe the capability of automotive batteries. Specifically, CCA describes the number of amps the battery can supply at 0°F for 30 seconds while maintaining a voltage of 7.2 volts.

What if I cannot charge my battery every day?

You may still be able to use a single battery to power your ResMed device. The tables in this guide provide the AH requirement for a deep-cycle battery to power a device for one day (8 hours). Multiplying the required AH value for your device/pressure combination by the number of days between charges, results in the AH rating of the deep-cycle battery to meet your needs. **CAUTION:** Be sure to confirm with your battery provider that this approach applies to your usage scenario and the deep-cycle battery you wish to use.

Should I use a converter or inverter?

Whenever possible, we strongly recommend the use of a DC-to-DC converter to power your ResMed device. Converters are more efficient than inverters with less potential for unexpected results which can occur from using the wrong type of inverter.

What are the benefits of using a converter instead of an inverter?

The benefits of using converters instead of inverters include:

- Converters are more efficient than inverters.
- Converters provide electrical protection to the device if the leads are incorrectly connected to the battery.
- Converters provide regulation of the battery voltage.
- Converters shutdown automatically when the voltage drops below a certain threshold and protects the battery from damage by not allowing a full discharge.
- Converters provide electrical isolation to the device.

The following illustrates a ResMed DC-to-DC converter:



What is the difference between a pure and modified sine wave inverter?

A pure sine wave inverter produces a smooth output waveform matching that of a domestic power outlet. By comparison, modified sine wave converters alternate voltage in steps which can damage sensitive electronics.

How do I connect my converter to a stand-alone battery?

All ResMed converters have one cable that connects to your device and another cable that plugs into a vehicle's DC power outlet (cigarette lighter receptacle). You will need a cable adapter to connect the converter to a stand-alone battery. The cable adapter has a DC power outlet at one end and a pair of alligator clips at the other. You plug the converter DC power plug into the DC power outlet of the cable adapter and then connect the alligator clips of the cable adapter to the appropriate terminals of your battery.



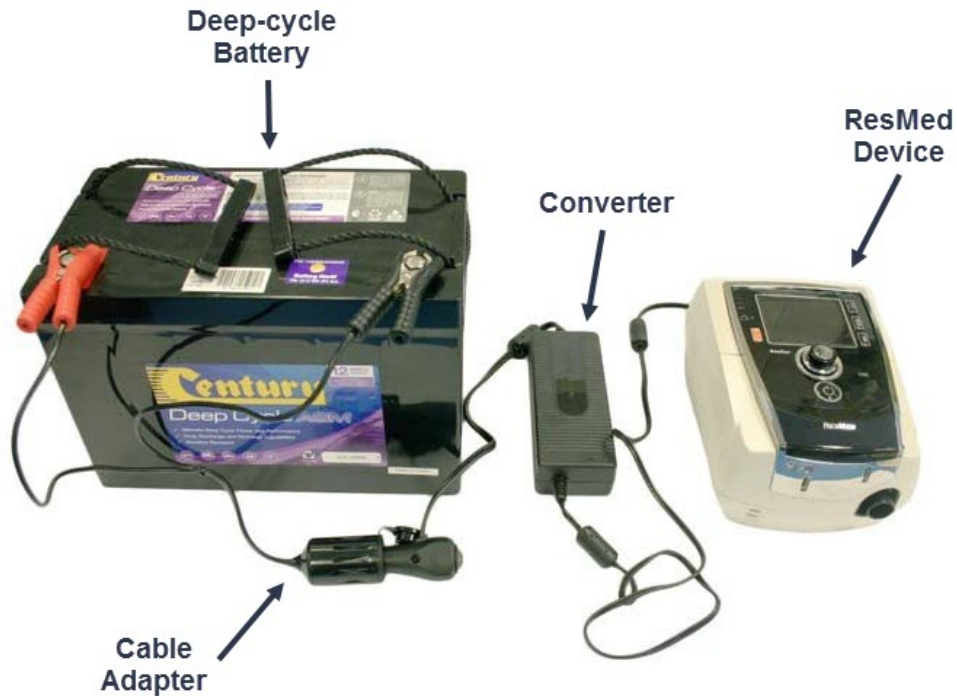
How do all the components connect together?

Assemble your components as follows:

1. Connect the alligator clips of your cable adapter to the appropriate terminals on your stand-alone, deep-cycle battery (be sure to properly align the positive and negative clips to the appropriate terminals on the battery).
2. Plug the DC-source plug from your ResMed DC-to-DC converter into the DC power outlet on the cable adapter attached to your battery.
3. Connect the device power cord from the DC-to-DC converter into the power port of your ResMed device.

NOTE: With inverters, plug the ResMed device AC power supply into the inverter and the device.

The following image illustrates a Stellar connected to a battery using a converter and cable adapter:



BATTERY SELECTION CHART

This chart shows how to identify an appropriate battery size to power your ResMed device. Begin at the “Start” bubble and work your way through the questions until you reach the “End” bubble.

