



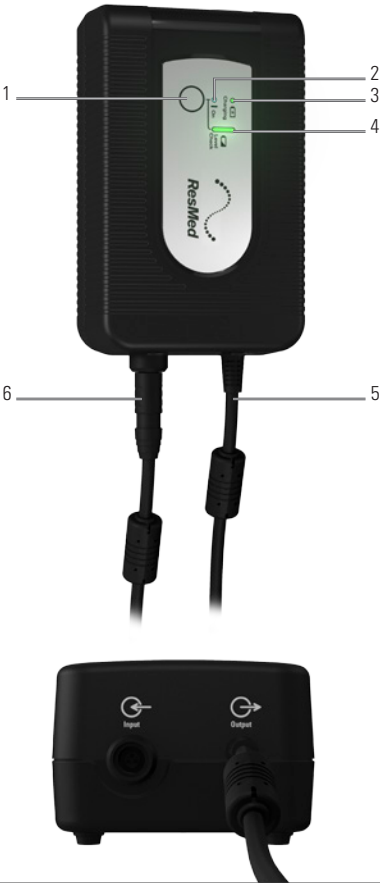
ResMed

Astral™ External Battery



User guide
English

A



B



Astral External Battery

User Guide

English

Intended use

The Astral External Battery ('External Battery') is an external lithium-ion battery intended for hospital and home use with the Astral series of ventilators.

It is intended to provide Astral ventilators with eight hours of power during typical use.

Refer to the Astral device User Guide for intended patients, uses and contraindications associated with ventilation therapy.

At a glance

Refer to illustration A

- | | |
|------------------------------|-------------------------------|
| 1. On and level check button | 4. Level indicator |
| 2. On indicator | 5. Integrated DC output cable |
| 3. Charging indicator | 6. DC input port |

Components:

- Battery with integrated DC output cable and DC input port
- User Manual

Available separately:

- Astral DC Adapter (optional accessory)

Compatible devices and accessories

The External Battery is compatible with the Astral 100 and Astral 150 series of ventilators.

General warnings and cautions

The following are general warnings and cautions. Further specific warnings, cautions and notes appear next to the relevant instruction in the user guide.

A **warning** alerts you to possible injury.

WARNING

- The battery is to be used only in accordance with the intended use stated in this guide. Damage to equipment or injury can result from modifications to the equipment.
- Do not open or disassemble the battery as it has no user-serviceable parts inside; if damaged or defective, contact your authorised ResMed representative.
- The External Battery should be serviced every two years or when there is a noticeable reduction in usage time when fully charged. Refer to the Servicing section in this guide.
- Before using for the first time, ensure that the battery and its components are in good condition. If there are any defects, the External Battery should not be used.
- Explosion hazard—do not use in the vicinity of flammable anaesthetics.
- Due to risk of fire or electric shock do not place the battery near open fire or heaters. Do not expose the battery to direct sunlight or heat (for example behind a car window). Do not short-circuit the battery.

- Lithium-ion batteries have built-in safety protection circuits, but can still be dangerous if they are not used correctly. Damaged batteries can become inoperative or catch fire.
- The External Battery is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or who lack experience and knowledge, unless they have been given supervision or instruction concerning use of the External Battery by a person responsible for their safety.
- Children should be supervised to ensure that they do not play with the External Battery.

A **caution** explains special measures for the safe and effective use of the device.

CAUTION

- Do not drop the External Battery. Avoid hard physical impact on the battery.
- Ensure the External Battery is kept dry. Do not expose to water, rain or high moisture levels.

Indicators

Refer to illustration A.

The capacity and operation of the External Battery are indicated on both the External Battery and the Astral device.

The LED indicators on the External Battery display its current operating state.

Checking the charge on the battery

- Press .
- The Battery Level Check LED indicator illuminates for 5 seconds.

Indicator		External Battery status
On/Level Check button		
		Press to power on battery or check battery level
DC on/off LED		
	Constant blue	Battery turned on
Charging LEDs		
	Flashing green	Charging
	Constant green	Fully charged
Level Check LEDs		
	Four green continuous	Greater than 90% (approximate)
	Three green continuous	65% to 90% (approximate)
	Two green continuous	40% to 65% (approximate)
	One green continuous	10% to 40% (approximate)
	One green flashing	Less than 10%
	One amber flashing	Less than 5%

Once the External Battery is connected to the Astral device, the DC mains indicator on user interface will illuminate.

Accessing battery information via the Astral user interface

Information on system and battery charge levels can be accessed in one of two ways.

1. Battery indicator

The capacity of the External Battery will be added to the Run Time indicator on the Information bar of the Astral user interface (this may take a couple of minutes). The total will be the sum of the Astral internal battery plus either one or two external batteries.

Note: Under normal operating conditions, the ventilator will display total system:

- State of charge as a percentage when in ventilation standby mode or connected to mains power.
- Estimated remaining run time while delivering therapy.

2. Battery information

The battery information can be accessed from the Battery sub-menu on the Information page of the Astral user interface. This menu has two tabs:

Charge—displays the current charge level (0-100%) for any batteries currently detected by the system, as well as the total system charge.

Maintenance—displays the full charge capacity and the charge cycle count for any batteries currently detected by the system.

Regularly check the charge level of the external battery. It is recommended to replace the battery at 400 charge cycles.

Refer to the Astral User Guide for further information.

Charging the External Battery

The External Battery is supplied partially charged.

Ensure the External Battery is fully charged before using it to power the Astral device. The External Battery can be used and recharged while connected to the Astral device (refer to the Using and recharging the External Battery section in this guide).

Charging takes less than 6 hours from 0% battery capacity to greater than 95%.

WARNING

- Only use an Astral 90W AC power supply unit to charge the External Battery.
- As the External Battery ages, the available capacity decreases. When the remaining battery capacity is getting low, do not rely on the External Battery as the primary supply.
- The External Battery cannot be charged from DC mains.

Refer to illustration B.

1. Connect the AC power supply cable to the DC input port of the External Battery.
2. Connect the other end of the AC power supply cable into the mains power outlet. Charging is indicated by  (refer to the Indicators section in this guide).

Note: If required, the External Battery DC output cable can be connected into the DC input port of the Astral device while the External Battery is charging. The Astral device will then continue to operate using mains power.

3. A fully charged External Battery is indicated by . To discontinue charging, disconnect the External Battery from the AC power cable.

Powering on the External Battery

To power on the External Battery:

- Connect it to an Astral device that is powered on or;
- Press .

Note: The External Battery automatically powers off after 5 minutes of inactivity.

Using and recharging the External Battery

When connected to Astral and mains power, the External Battery recharges (refer to the Charging sequence section in this guide).

Using and recharging with the Astral device

Connecting a fully charged External Battery to the Astral device can provide 8 hours of power during typical use.

Refer to illustration B.

1. Connect the External Battery DC output cable into the DC input port of the Astral device.
2. Connect the AC power supply cable to the DC input port of the External Battery.
3. Plug the other end of the AC power supply cable into the mains power outlet. The AC mains indicator on the Astral interface will illuminate.

Using two External batteries with the Astral device

A second fully charged External Battery can be connected to the Astral device to provide a further 8 hours of power during typical use. A maximum of two External batteries can be connected to the Astral device.

CAUTION

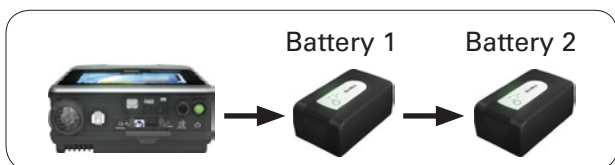
Do not attempt to connect more than two external batteries. Battery specific messages and alarms on the Astral device will not operate for any additional units.

Refer to illustration C.

1. Connect the first External Battery DC output cable into the Astral DC input port.
2. Connect the second External Battery DC output cable into the DC input port of the first External Battery.
3. Connect the AC power supply cable to the DC input port of the second External Battery.
4. Plug the other end of the AC power supply cable into the mains power outlet.

Charging sequence

1. The internal battery of the Astral device is charged first.
2. Once the internal battery is fully charged, the External Battery (Battery 1) is charged next.
3. If a second External Battery (Battery 2) is connected, it is charged after Battery 1 is fully charged.



Note: The batteries are discharged in the reverse order (ie, the internal battery is discharged last).

Setting up for mobile use

The External Battery is ideal for mobile use (ie, with a wheelchair) when backup power for the Astral device may be required. In mobile situations, regularly check the charge on the External Battery.



Note: The Mobility bag has a compartment capable of holding only one External Battery. If travelling with more than one external battery, wait until the first external battery is depleted (as indicated by the Using internal battery alarm) before swapping over to the other external battery. The Astral device will continue to ventilate using the internal battery while the external batteries are swapped.

WARNING

- The internal battery will provide backup power in the event of External Battery power loss. Ensure the internal battery of the Astral device is sufficiently charged before using the External Battery.
- Ensure the External Battery is sufficiently charged before using in mobile situations. A fully charged External Battery can provide 8 hours power during typical use.
- When the remaining capacity of all external batteries is low, ensure that continuity of power can be maintained by reverting to AC mains.

Connecting to the Astral device for mobile use

Refer to illustration C.

When using the External Battery in mobile situations, simply connect the External Battery DC output cable into the DC input of the Astral device.

If required, a second External Battery can be connected.

Connect the second External Battery DC output cable to the DC input port of the first External Battery.

When used with the Mobility Bag, always ensure the External Battery is secured in the External Battery compartment (**illustration D**). The Mobility bag is capable of holding only one External Battery. Refer to the Mobility Bag User Guide for instructions.

Air travel

Consult with your carrier if you intend to take the External Battery on board with your device.

When travelling with the External Battery:

- For your convenience at security stations, it may be helpful to keep a printed copy of the External Battery User Guide to help security personnel understand the device and refer them to the following statements:
 - ResMed confirms that the External Battery meets the Federal Aviation Administration (FAA) requirements (RTCA/DO-160, section 21, category M) for all phases of air travel.
 - ResMed confirms that the External Battery meets IATA classification: UN 3480 – Lithium-ion batteries.

Cleaning and maintenance

The cleaning and maintenance described in this section should be carried out regularly.

Wipe the exterior of the battery with a clean slightly damp cloth. Refer to the User Guides for the patient interface, humidifier and other accessories in use for detailed instructions for care and maintenance of those devices.

CAUTION

- Clean only exterior surfaces of the External Battery.
- Do not immerse the External Battery in water, and do not pour liquids or solvents onto any part of the External Battery.

The following cleaning solutions are compatible for use on a weekly basis (except as noted) when cleaning the external surfaces of the Astral device:

- Isopropanol
- Actichlor Plus
- Bleach (1:10) (may also be known as 'dilute hypochlorite').
- Cavicide*
- Mikrozid*

*Suitable for cleaning on a monthly basis only.

Storage

Ensure that the External Battery is clean and dry before storing for any length of time. Store the External Battery in a dry place out of direct sunlight.

CAUTION

- The External Battery must be charged to at least 65-90% (indicated by three green LEDs) and switched off before storing.
- When not in use, all Lithium-ion batteries self-discharge over time. Recharge the External Battery to at least 65-90% after six months of storage.

- If not periodically recharged (ie, every six months), the External Battery will eventually self-discharge to the point that it can no longer be recharged. If this occurs the External Battery is no longer usable and is unrecoverable.
- Storing the External Battery at high temperatures increases the rate of self-discharge.

Servicing

The External Battery should be serviced by an authorised ResMed Service Centre every two years. The External Battery is intended to provide safe and reliable operation provided that it is operated and maintained in accordance with the instructions provided by ResMed. As with all electrical devices, if any irregularity becomes apparent, you should exercise caution and have the device inspected by an authorised ResMed Service Centre.

Troubleshooting

If there is a problem, try the following suggestions. If the problem cannot be solved, contact your equipment supplier or ResMed. Do not attempt to open the battery.

Problem/Possible cause	Solution
LED indicators are not illuminated	
Power connections are disrupted.	Check all cables and connect them as described in Setting up.
External Battery is discharged.	Connect the device to the mains power supply and recharge the External Battery.
External Battery is off.	Press level check/On button for at least two seconds.
External Battery failure.	Consult your ResMed representative.
External Battery amber LED is flashing.	
The External Battery charge level is less than 5%.	Recharge the External Battery as soon as possible.
External Battery green level LED is flashing	
The battery charge level is below 10%.	Recharge the External Battery as soon as possible.
Charging terminates	
Charging complete	External Battery is ready to use.
The ambient temperature is warmer than 30°C.	Charge the External Battery where the ambient temperature is cooler than 30°C.
Battery turns off and stops powering device	
The ambient temperature is warmer than 40°C.	Move the External Battery to a location where the ambient temperature is cooler than 40°C.
Battery charge level indicator is inaccurate	
Ambient temperature is at extreme condition (eg, -5°C, +40°C).	Move External Battery to a location where ambient temperature is between -5°C and +40°C and charge via AC mains.

Alarms Troubleshooting

Alarms and messages relating to the External Battery may occur from time to time. All message information will be displayed on the Astral User interface, and will be accompanied by an audible signal.

Refer to the Astral User Guide for further information

Technical specifications

Battery technology	Lithium-ion
Capacity	< 100 Wh (97 Wh)
UN classification	UN3480 (lithium-ion batteries)
Power supply	Input range 100–240V, 50–60Hz, 1.0-1.5A Nominal for aircraft use 110V, 400Hz
Battery output voltage	(20V / 24V) ± 1V, 90W continuous
Battery output current (rated)	4.5 A / 3.75 A
Protection	Overcharge, overdischarge, excess current, short circuit, high temperature
Dimensions (L x W x H)	168 mm x 104 mm x 72 mm
Battery weight	1.2 kg typical
Typical life cycle	400 charge cycles at 23°C to 80% capacity
Operating conditions	
Charging:	10°C to 35°C; 5–93% maximum humidity
Discharging:	0°C to 40°C; 5–93% maximum humidity
Transport/storage conditions	-20°C to +50°C; 5–93% relative humidity (non-condensing)
Operating/storage air pressure	700 hPa to 1100 hPa
Recharge time	< 6 hrs to full level (100%)
Electromagnetic compatibility	Product complies with all applicable electromagnetic compatibility requirements (EMC) according to IEC60601-1-2, for residential, commercial, and light industry environments. Information regarding the electromagnetic emissions and immunity of these ResMed devices can be found on www.resmed.com/downloads/devices .
Aircraft use	ResMed confirms that the External Battery meets the Federal Aviation Administration (FAA) requirements (RTCA/DO-160, section 21, category M) for all phases of air travel. IATA classification for internal battery: UN 3481 – Lithium-ion batteries contained in equipment. External Battery is UN3480

IEC 60601-1
classification

Class II (double insulation) and/or Internally Powered Equipment, IP21, Continuous Operation (from mains), Limited Operation (from battery), Equipment not suitable for use in the presence of a flammable anaesthetic mixture with air, or nitrous oxide. The External Battery, while connected to a device and discharging, is rated to IP21 (Drip proof) according to IEC60529. The AC power supply and the Astral External Battery are both rated to IP21.

Battery run time < 8 hrs of typical use¹

¹Operating hours with a new battery under normal conditions. Test conditions: Adult, P(A)CV mode, P insp: 20 hPa, PEEP: Off, Rate: 15 BPM, Ti: 1.2s. Time may vary with environmental conditions.

Note: The manufacturer reserves the right to change these specifications without notice.

Symbols

The following symbols may appear on the device or packaging:

 Attention, consult accompanying documents;  Read instructions before use;  Protected against finger sized objects and against vertically dripping water;  Class II equipment;  European RoHS;  Batch Code;  Serial number;  Catalogue number;  Humidity limitation;  Keep dry;  Temperature limitation (storage and transport);  External Battery charge level;  External Battery charging indicator;  Direct current;  DC on/off;  DC Input port;  DC Output;  Do not use if package is damaged;  Canadian Standards Association;  Manufacturer;  European Authorized Representative



Environmental Information

Disposal of the battery should be carried out in accordance with applicable national laws and regulations. WEEE 2002/96/EC is a European Directive that requires the proper disposal of electrical and electronic equipment. The battery should be disposed of separately, not as unsorted municipal waste. To dispose of your battery, you should use appropriate collection, reuse and recycling systems available in your region. The use of these collection, reuse and recycling systems is designed to reduce pressure on natural resources and prevent hazardous substances from damaging the environment. European Directive 2006/66/EC requires the proper disposal of spent batteries. The battery may only be returned to collection points fully discharged. If charged or partially discharged, care should be taken to prevent short circuiting. Batteries containing more than 0.0005% of mercury by mass, more than 0.002% of cadmium by mass or more than 0.004% of lead by mass are marked below the crossed-bin symbol with the chemical symbols (Hg, Cd, Pb) of the metals for which the limit is exceeded.

If you need information on these disposal systems, please contact your local waste administration. The crossed-bin symbol invites you to use these disposal systems. If you require information on collection and disposal of your ResMed device please contact your ResMed office, local distributor or go to www.resmed.com/environment.

Limited warranty

ResMed Pty Ltd (hereafter 'ResMed') warrants that your ResMed product shall be free from defects in material and workmanship from the date of purchase for the period specified below.

Product	Warranty period
- Mask systems (including mask frame, cushion, headgear and tubing)—excluding single-use devices - Accessories—excluding single-use devices - Flex-type finger pulse sensors - Humidifier water tubs	90 days
Batteries for use in ResMed internal and external battery systems	6 months
- Clip-type finger pulse sensors - CPAP and bilevel device data modules - Oximeters and CPAP and bilevel device oximeter adapters - Humidifiers and humidifier cleanable water tubs - Titration control devices	1 year
- CPAP, bilevel and ventilation devices (including external power supply units) - Battery accessories - Portable diagnostic/screening devices	2 years

This warranty is only available to the initial consumer. It is not transferable.

If the product fails under conditions of normal use, ResMed will repair or replace, at its option, the defective product or any of its components.

This limited warranty does not cover: a) any damage caused as a result of improper use, abuse, modification or alteration of the product; b) repairs carried out by any service organisation that has not been expressly authorised by ResMed to perform such repairs; c) any damage or contamination due to cigarette, pipe, cigar or other smoke; and d) any damage caused by water being spilled on or into an electronic device.

Warranty is void on product sold, or resold, outside the region of original purchase.

Warranty claims on defective product must be made by the initial consumer at the point of purchase.

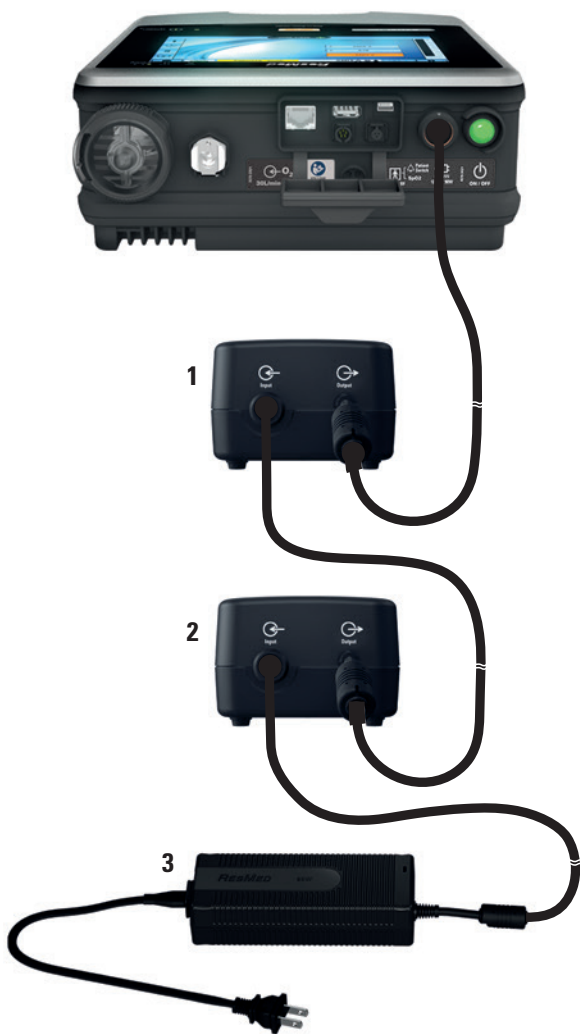
This warranty replaces all other expressed or implied warranties, including any implied warranty of merchantability or fitness for a particular purpose. Some regions or states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

ResMed shall not be responsible for any incidental or consequential damages claimed to have resulted from the sale, installation or use of any ResMed product. Some regions or states do not allow the exclusion or limitation of incidental or

consequential damages, so the above limitation may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary from region to region. For further information on your warranty rights, contact your local ResMed dealer or ResMed office.

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ResMed Pty Ltd

1 Elizabeth Macarthur Drive, Bella Vista NSW 2153 Australia

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