

TABLE OF CONTENTS

Safety Instructions.....	3
Preparing To Charge.....	5
Charger Location.....	5
DC Connection Precautions.....	6
Qualifying Your Battery:	8
Testing A Filler Cap Lead Acid Battery.....	8
Testing With A Hot/Cold Calibrated Hydrometer Tester.....	10
Testing A Sealed, AGM Or Flooded (wet-cell) Lead Acid Battery	10
Unit With Call-outs.....	12
Simplified Operating Instructions.....	13
LED Indicator Functions.....	14
BatteryMINDER Unit Label	15
Detailed Operation Instructions.....	16
Temperature Sensor ABS-248 (At-the-Battery Sensor).....	17, 21 - 24
Maintaining Multiple Batteries.....	24
Battery Configurations.....	25
Troubleshooting - Model 24041-AA-S3.....	26
Detailed Specifications - VDC Model No. 24041-AA-S3.....	29 - 33
Charging Profile.....	34
For Repair Or Replacement.....	35
Warranty.....	36

VDC Electronics, Inc.
147 D Woodbury Rd.
Huntington, NY 11743 U.S.A.
www.BatteryMINDers.com
techsupport@vdcelectronics.com

**Underwriters Laboratories (UL)
REQUIRED IMPORTANT SAFETY INSTRUCTIONS for
the BATTERYMINDER 2000 SERIES
WARNING: TO REDUCE THE RISK OF FIRE, ELECTRIC
SHOCK, OR INJURY TO PERSON, OBSERVE THE
FOLLOWING:**

1. SAVE THESE INSTRUCTIONS

This manual contains important safety and operating instructions for BatteryMINDER 24041-AA-S3 Series.

2. Do not expose charger to rain or snow.
3. Use of an attachment not recommended or sold by VDC Electronics may result in a risk of fire, electric shock, or injury to persons.
4. To reduce risk of damage to electric plug and cord, pull by plug rather than cord when disconnecting charger.
5. An extension cord should not be used unless absolutely necessary. Use of improper extension cord could result in a risk of fire and electric shock. If an extension cord must be used, make sure:
 - a) That pins on plug of extension cord are the same number, size, and shape as those of plug on charger;
 - b) That extension cord is properly wired and in good electrical condition; and
 - c) That wire size is large enough for ac ampere rating of charger as specified in Table below.

Recommended minimum AWG size for extension cords for battery chargers					
AC Input Rating, amperes^a		AWG Size of Cord			
Equal To or Greater Than	But Less Than	Length of Cord, feet (m)			
		25 (7.6)	50 (15.2)	100 (30.5)	150 (45.6)
0	2	18	18	18	16
^a If the input rating of a charger is given in watts rather than in amperes, the corresponding ampere rating is to be determined by dividing the wattage rating by the voltage rating - for example: 1250 watts/125 volts = 10 amperes					

6. Do not operate charger with damaged cord or plug – replace the cord or plug immediately.
7. Do not operate charger if it has received a sharp blow, been dropped, or otherwise damaged in any way; call **VDC Electronics Tech Support Dept. 800.379.5579 x206 (ET)** for advice.
8. Do not disassemble charger; call **VDC Electronics Tech Support Dept. 800.379.5579 x206 (ET)** for advice when service or repair is required. Incorrect reassembly may result in a risk of electric shock or fire.
9. To reduce risk of electric shock, unplug charger from outlet before attempting any maintenance or cleaning. Turning off controls will not reduce this risk.

10. WARNING – RISK OF EXPLOSIVE GASES

a) **WORKING IN VICINITY OF A LEAD-ACID BATTERY IS DANGEROUS. BATTERIES GENERATE EXPLOSIVE GASES DURING NORMAL BATTERY OPERATION. FOR THIS REASON, IT IS OF UTMOST IMPORTANCE THAT YOU FOLLOW THE INSTRUCTIONS EACH TIME YOU USE THE CHARGER.**

b) To reduce risk of battery explosion, follow these instructions and those published by manufacturer of any equipment you intend to use in vicinity of battery. Review cautionary marking on these products and on engine.

11. PERSONAL PRECAUTIONS

a) Consider having someone close enough by to come to your aid when you work near a lead-acid battery.

b) Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing, or eyes.

c) Wear complete eye protection and clothing protection. Avoid touching eyes while working near battery.

d) If battery acid contacts skin or clothing, wash immediately with soap and water. If acid enters eye, immediately flood eye with running cold water for at least 10 minutes and get medical attention immediately.

e) NEVER smoke or allow a spark or flame in vicinity of battery or engine.

f) Be extra cautious to reduce risk of dropping a metal tool onto battery. It might spark or short-circuit battery or other electrical part that may cause explosion.

- g) Remove personal metal items such as rings, bracelets, necklaces, and watches when working with a lead-acid battery. A lead-acid battery can produce a short-circuit current high enough to weld a ring or the like to metal, causing a severe burn.
- h) Use charger for charging a LEAD-ACID battery only. It is not intended to supply power to a low voltage electrical system other than in a starter-motor application. Do not use battery charger for charging dry-cell batteries that are commonly used with home appliances. These batteries may burst and cause injury to persons and damage to property.
- i) NEVER charge a frozen battery or a battery at a temperature above 123° F.

12. PREPARING TO CHARGE

- a) If necessary to remove battery from vehicle to charge, always remove grounded terminal from battery first. Make sure all accessories in the vehicle are off, so as not to cause an arc.
- b) Be sure area around battery is well ventilated while battery is being charged.
- c) Clean battery terminals. Be careful to keep corrosion from coming in contact with eyes.
- d) Add distilled water in each cell until battery acid reaches level specified by battery manufacturer. Do not overfill. For a battery without removable cell caps, such as valve regulated lead acid batteries, carefully follow manufacturer's recharging instructions.
- e) Study all battery manufacturer's specific precautions while charging and recommended rates of charge.
- f) Determine voltage of battery by referring to car owner's manual and make sure it matches output rating of battery charger.

13. CHARGER LOCATION

- a) Locate charger as far away from battery as DC cables permit.
- b) Never place charger directly above battery being charged; gases from battery will corrode and damage charger.
- c) Never allow battery acid to drip on charger when reading electrolyte specific gravity or filling battery.
- d) Do not operate charger in a closed-in area or restrict ventilation in any way.
- e) Do not set a battery on top of charger.

14. DC CONNECTION PRECAUTIONS

- a) Connect and disconnect dc output clips only after setting any charger switches to “off” position and removing AC cord from electric outlet. Never allow clips to touch each other.
- b) Attach clips to battery and chassis as indicated in 15(e), 15(f), and 16(b) through 16(d).

15. FOLLOW THESE STEPS WHEN BATTERY IS INSTALLED IN VEHICLE. A SPARK NEAR BATTERY MAY CAUSE BATTERY EXPLOSION.

TO REDUCE RISK OF A SPARK NEAR BATTERY:

- a) Position ac and dc cords to reduce risk of damage by hood, door, or moving engine part.
- b) Stay clear of fan blades, belts, pulleys, and other parts that can cause injury to persons.
- c) Check polarity of battery posts. POSITIVE (POS, P, +) battery post usually has larger diameter than NEGATIVE (NEG, N,-) post.
- d) Determine which post of battery is grounded (connected) to the chassis. If negative post is grounded to chassis (as in most vehicles), see (e). If positive post is grounded to the chassis, see (f).
- e) For negative-grounded vehicle, connect POSITIVE (**RED**) clip from battery charger to POSITIVE (POS, P, +) ungrounded post of battery. Connect NEGATIVE (**BLACK**) clip to vehicle chassis or engine block away from battery. Do not connect clip to carburetor, fuel lines, or sheet-metal body parts. Connect to a heavy gage metal part of the frame or engine block.
- f) For positive-grounded vehicle, connect NEGATIVE (**BLACK**) clip from battery charger to NEGATIVE (NEG, N, -) ungrounded post of battery. Connect POSITIVE (**RED**) clip to vehicle chassis or engine block away from battery. Do not connect clip to carburetor, fuel lines, or sheet-metal body parts. Connect to a heavy gage metal part of the frame or engine block.
- g) When disconnecting charger, turn switches to off, disconnect AC cord, remove clip from vehicle chassis, and then remove clip from battery terminal.
- h) See operating instructions for length of charge information.

16. FOLLOW THESE STEPS WHEN BATTERY IS OUTSIDE VEHICLE. A SPARK NEAR THE BATTERY MAY CAUSE BATTERY EXPLOSION.

TO REDUCE RISK OF A SPARK NEAR BATTERY:

- a) Check polarity of battery posts. POSITIVE (POS, P, +) battery post usually has a larger diameter than NEGATIVE (NEG, N, -) post.
- b) Attach at least a 24-inch-long 6-gauge (AWG) insulated battery cable to NEGATIVE (NEG, N, -) battery post.
- c) Connect POSITIVE (**RED**) charger clip to POSITIVE (POS, P, +) post of battery.
- d) Position yourself and free end of cable as far away from battery as possible – then connect NEGATIVE (**BLACK**) charger clip to free end of cable.
- e) Do not face battery when making final connection.
- f) When disconnecting charger, always do so in reverse sequence of connecting procedure and break first connection while as far away from battery as practical.
- g) A marine (boat) battery must be removed and charged on shore. To charge it on board requires equipment specially designed for marine use.

QUALIFYING YOUR BATTERY:

Preliminary Requirements

NOTE: The BatteryMINDER has no electrical output unless it is connected to a healthy battery. Testing the BatteryMINDER with a volt or an Amp meter without the unit being connected across a good battery will result in a false reading. If you experience any problems, or are not sure of how to properly use or connect your BatteryMINDER, please e-mail our technical support at: techsupport@vdcelectronics.com.

To gain the best result from your new charger and to maximize the life and performance of your batteries we strongly recommend you qualify (test) your batteries before attempting to either charge-maintain or desulfate them. Remember, even if you just purchased a “new” battery it may have been subjected to conditions that have caused “sulfation” such as high temperature ($\geq 80^\circ$).

NOTE: If your battery is new and you are certain it was not subject to conditions that could have caused sulfation*, even before you purchased it, then you can disregard our recommendations for qualifying / testing your battery, before using the BatteryMINDER.

* Such as high temperature storage ($\geq 80^\circ\text{F}$) and/or allowed to self-discharge to 24.8 Volts or lower.

Testing a Filler Cap Lead Acid Battery

1. Carefully remove all filler caps from your battery.
2. Check the water-liquid electrolyte level. If the level is low or has ever been below top of plates, severe lead plate sulfation has taken place. Significant recharge/reconditioning time is needed to restore these plates to a condition where the battery can be expected to function normally.
3. Refill each cell with distilled water only to the liquid level indicator found in each cell. **Before proceeding further you must be thoroughly familiar with the safety and operating instructions.**
4. Recharge the battery with the BatteryMINDER to ensure that it is slowly and completely charged before you determine its condition.

Allow battery to “rest”* overnight or momentarily apply a small load to remove the “surface” charge which creates false voltage readings. * **“RESTED” = a battery that has been as fully charged as possible, using a 3 stage charger (model 24041-AA-S3) and left disconnected from charger or any type load for a minimum of 12 hours.**

5. If the BatteryMINDER battery condition LED lights (**YELLOW**) within 72 hours (single battery) or no balls float in one or more cells, your battery may be too far gone to be fully desulfated. Reconnect battery to your BatteryMINDER. Allow battery to remain in maintenance mode for a minimum of 72 hours, before re-test. Use a hot/cold calibrated hydrometer tester for the most accurate results (see Table 1) if you see an increase in the Specific Gravity (SG) or voltage indicating that there is an improvement in the battery’s condition, continue desulfating for an additional 72 hours and retest the battery. Continue this process until the SG or voltage readings no longer increase.

Specific Gravity – Capacity

Temp. Compensated Hydrometer - meter or 4 ball type	Full Capacity Percentage
1.285	100%
1.245	75%
1.210	50%
1.175	25%
1.140 May denote shorted cell or battery that has been severely discharged and may not be recoverable	0%

TABLE 1

Testing with a Hot/Cold Calibrated Hydrometer Tester

Read the tester instructions carefully for most accurate readings.

1. When using the tester the first time or after a long period of non-use, fill the tester with the battery fluid and let it sit for 1/2 hour or longer. This will soak the balls in order to give you more accurate readings. Failure to do so will give you false readings indicating a battery that may not be in as good a condition as you may have thought.
2. After inserting the tester in a cell, gently tap the tester several times against the inside wall of each cell to dislodge air bubbles that will cause more balls to float than should. Failure to do so will yield false readings that indicate a battery that is not fully desulfated or does not qualify for desulfation.
3. If no balls float in any cell, the cell is shorted. This means your battery is beyond the point of being properly recharged or reconditioned-desulfated. Dispose of the battery. If each cell floats three (3) or more balls (or 1250 on gauge-type), your battery can be desulfated-reconditioned.
4. Always rinse the tester with fresh water after every use. Failure to do so will cause false readings.

Testing a Sealed, AGM or Flooded (wet-cell) Lead Acid Battery

These batteries have no filler caps or manifold-type covers. Because you cannot gain access to the interior of your battery you cannot test it with a hydrometer.

USE A DIGITAL VOLTMETER ONLY:

1. Recharge the battery with the BatteryMINDER to ensure it is as completely charged as possible, before you determine its condition. Allow battery to “rest” (see pg. 9) overnight for a minimum of 12 hours before testing with a digital voltmeter only. Failure to test a “rested” (see pg. 9) battery will cause false readings. Be certain to read and understand all safety related instructions (pages 3 to 7) before proceeding further.
2. Measure battery’s voltage, without any load attached. If the voltage is less than 25.2 volts (Typically 75% of charge) the battery may be too heavily sulfated to be fully recoverable. If voltage is 25.2-V or

higher full recovery can be expected, given sufficient time (average 1-2 weeks for batteries that are heavily sulfated).

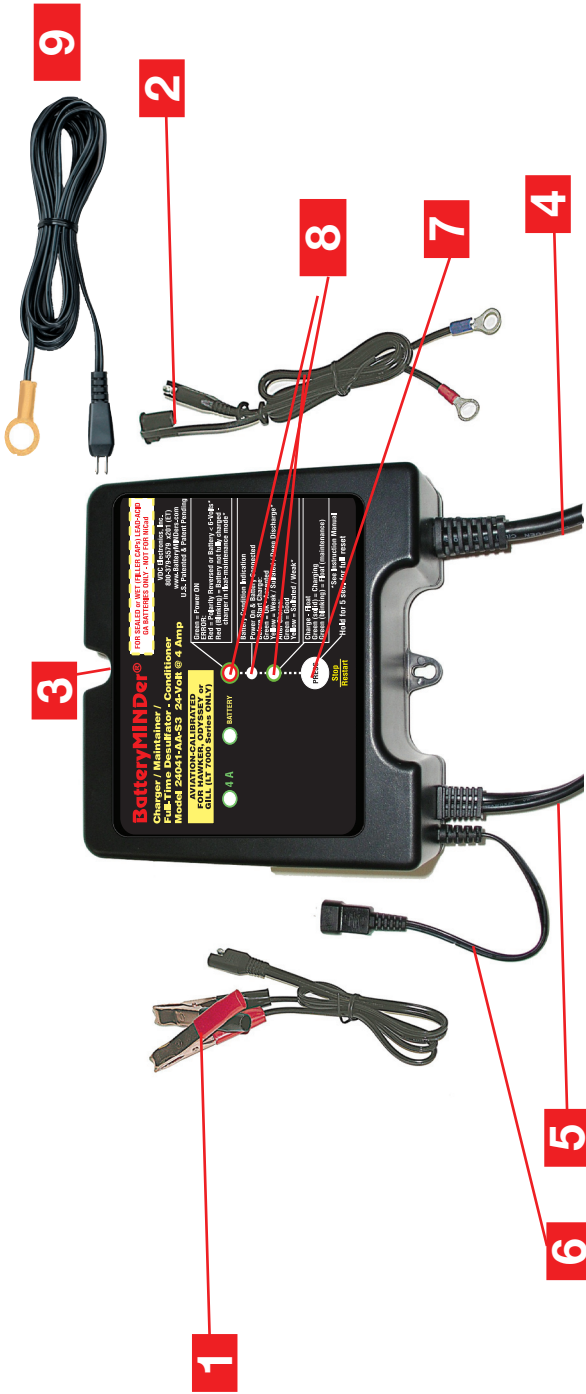
3. Connect the BatteryMINDER to the battery.
4. Charge battery to its maximum level. Allow battery to remain for a minimum of 72 hours before retesting. If improvement is seen, continue until battery voltage reaches full capacity level or no further increase is seen.

OCV=Open Circuit No Load Voltage

OCV - "Rested" Voltage	Full Capacity Percentage
25.8 - 26.2 Volts	100%
25.2 - 25.8 Volts	75%
24.8 - 25.2 Volts	50%
24.4 - 24.8 Volts	25%
24.0 - 24.4 Volts	0%
<22 Volts = shorted	

TABLE 2

Note: Do not expect to completely eliminate sulfate in a few days. Long established sulfate will require several weeks or longer to be fully dissolved. Be patient and you will be rewarded with a "sulfate-free" battery.



- 1) Battery clip cordset w/ quik connect plug (pgs.13, 16)
- 2) Ring terminal cordset w/ quik connect plug (pgs. 13, 16)
- 3) Mounting tabs
- 4) Input power cordset (pg. 13, 18)
- 5) Output cord w/ quik connect plug (pg. 13, 16)
- 6) Temperature sensor input connector (pg. 17)
- 7) Stop/Restart selection button
- 8) LED indicators for power, connection, fault, battery condition, charge status (pgs.13-15, 18-20, 24)
- 9) Temperature sensor with cord and ring terminal (pg. 17, 21 - 23)

Simplified Operating Instructions

(Read and thoroughly understand ALL SAFETY Instructions on pages (3-7) and Qualifying Your Battery pages 8-11, BEFORE proceeding further.

1. Attach a battery connector assembly (supplied) to output cordset of charger, either the clips or ring terminal assembly, - NEVER BOTH at same time.
2. Attach output to battery terminals - **RED** band = Positive (+), **BLACK** band = Negative (-).
- 2-a: Attach temperature sensor ABS-248 to battery and then to charger*.
3. Plug AC power cord into electrical outlet. Observe REVERSED Polarity LED indicator. If lit **RED**, reverse battery connector attachments on battery.
4. Observe **GREEN** LED indicator labeled Charge-Float = Solid when charging, Blinking when maintaining battery(s). **Charger will automatically start within 30 seconds or less.**
5. Observe Battery Connected - Error Indicator, LED Must be lit **GREEN.****

IF IN DOUBT REGARDING ANY OF THE ABOVE, REFER TO FULL INSTRUCTIONS

* See detailed instructions for need and method of properly connecting sensor to battery, pgs. 20 - 22.

** See full instructions if not lit **GREEN**.

LED INDICATOR FUNCTIONS -- Tables 3 (top) and 4 A&B (bottom)

		Battery Condition Indication
Battery connected BEFORE full charge:	$V_b < 22V$	YELLOW
	$V_b > 22V$	GREEN
If Stop/Restart Button in Pressed during charging mode		STOPS CHARGING. PRESS AGAIN TO RESTART.
Battery Sulfation check (AFTER FULL CHARGE & "RESTED" [See p.9]):	$V_b < 25.0V$	YELLOW
	$V_b > 25.0V$	GREEN

LED Status - (Battery Connected / Error and Charge LEDs)	CONNECTED / ERROR		CHARGE - FLOAT
	GREEN	RED	GREEN
A.C. power disconnected, battery connected correctly	OFF		OFF
A.C. power connected, battery connected	GREEN		OFF
A.C. power connected, battery connected (press Stop/Restart button)	GREEN		ON
At Soft Start mode, Bulk charge mode, Absorption mode	GREEN		ON
In Sulfate check mode Float charge mode	GREEN		FLASH
A.C. power connected Reversed Battery Polarity	RED ON		OFF
A.C. power connected, charger output Clip shorted	RED ON		OFF
A.C. power connected, battery voltage is less than 3V	RED ON		OFF
Timed-out when in SoftStart or Bulk mode	RED FLASH		OFF
Timed-out when in Absorption mode & Forced to Float mode	RED FLASH		FLASH
Battery Fault / Battery Weak	RED FLASH		OFF

BatteryMINDER 24041-AA-S3 Unit Label

BatteryMINDER®

Charger / Maintainer / Full-Time Desulfator - Conditioner
Model 24041-AA-S3 24-Volt @ 4 Amp

FOR SEALED or WET (FILLER CAPS) LEAD-ACID GA BATTERIES ONLY - NOT FOR NiCad

VDC Electronics, Inc.
800-379-5579 x201 (ET)
www.BatteryMINDers.com
U.S. Patented & Patent Pending

AVIATION-CALIBRATED FOR HAWKER, ODYSSEY or GILL (LT 7000 Series ONLY)

4 A **BATTERY**

Green = Power ON
ERROR:
Red = Polarity Reversed or Battery < 6-Volts*
Red (Blinking) = Battery not fully charged - charger in float-maintenance mode*

Battery Condition Indication
Power On & Battery Connected
Before Start Charge:
Green = OK - Accepted
Yellow = Weak / Sulfated / Deep Discharge*
After Charge:
Green = Good
Yellow = Sulfated / Weak*

Charge - Float
Green (solid) = Charging
Green (blinking) = Float (maintenance)

PRESS
Stop
Restart

*See Instruction Manual
Hold for 5 sec. for full reset

Detailed Operation Instructions

Model 24041-AA-S3

After carefully reading and understanding the Safety Instructions contained in this manual (pages 3 to 7) and having evaluated your battery as described in Qualifying Your Battery (pages 8 to 11) you are properly prepared to begin using your charger.

1. Attach output cord of charger to either the Battery Clip(s) Assembly (BCA) (supplied) or the Ring Terminal Assembly (RTA) (supplied) depending on your preference. However never use both assemblies at the same time for any reason whatsoever.

Never use either of these assemblies on any other charger or for any other purpose such as improvised “jumper cables”, etc.

Using the RTA on batteries remaining in their normal use location (in same place they are regularly installed will normally prove the safest and most convenient. If you have several applications you may wish to purchase additional Ring Terminal Assemblies (RTA) available from your dealer or VDC Electronics, Inc. directly.

Note: this assembly contains a 10 Amp automotive type fuse and is replaceable should for any reason it were to blow. Never replace this fuse with any type whose rating is higher than 10 Amps, as seriously harmful results may occur.

2. Identify the positive and negative posts or connections on your battery, usually clearly designated with the polarity markings of + (positive) and – (negative). If you have previously installed the RTA referred to in #1. above, you need only to press the connector plug of the charger’s output cord into the mating plug of the RTA. Push firmly and do not leave any space between them. Correct polarity and a good connection will be your reward. Attach the **BCA** to the proper

battery posts, clamps or screw terminals, depending on type of battery. **Note: Temperature Compensation Sensor Assembly (Part# ABS-248).** See pages 21 - 23 for full detailed instructions.

3. Plug the unit's Power cord into a standard – grounded 120 Vac electrical outlet. The Battery Connected LED Indicator will light **GREEN**. If it does not light **GREEN** check the outlet to be sure it is functioning. In addition, be sure if outlet is controlled by a switch, no one will accidentally shut off the power to the outlet. Check for correct polarity = (no **ERROR RED** LED Indicator). If **ERROR** Indicator is lit, reverse the charger's output connections to the battery.
4. **Charger will automatically start within 30 seconds or less.** The Charge – Float LED Indicator will light **GREEN**. The charger will now begin charging by first checking the battery to determine its voltage and ability to accept a charge. Should the battery not have a normal fully discharged voltage (10.5-V minimum) the unit will begin charging in the “Soft-Start” mode to determine if the battery can be safely charged. If it cannot, the Battery Connected – Error LED will flash **RED** and charging will be stopped. Battery should be carefully checked under a load by a qualified person before further attempting to charge it. **Note: If the battery does not have a minimum no load OCV (Open Circuit Voltage) of 6 volts, the ERROR LED will light RED and charger will reject battery.** No further effort should be made to charge this battery with this charger or any charger. Discard this battery, unless it has just been subjected to a long period of continuous discharge under a load such as can occur with leaving lights on or cranking an engine excessively. Allow such a battery to “Rest” for several hours (overnight if possible) before determining if it is

defective. Be very suspicious of any 24-V battery that does not have at least 22-Volts (OCV) before it is recharged. It may well be seriously damaged and unsafe for any type of use or recharge. The unit's Battery Condition Indication LED will help you determine if battery is less than 22-Volts (**YELLOW**) or greater than 22-Volts (**GREEN**)

5. After battery has been fully charged, the **GREEN** Charge-Float LED Indicator will begin blinking. It will continue to blink indefinitely, unless unit is disconnected from battery or Stop/Restart button is pressed. Should battery be unable to be fully charged, the LED will not blink and the **RED** Error LED will blink. Battery may not be able to be fully charged, may be too large or too deeply discharged to be fully charged in the normal time allowed by charger. If you are certain battery is not defective, having read and understood completely all of the above concerns and conditions, proceed to restart the charger by pressing and holding the Stop/Restart button for approx. 5 seconds until all LEDs Flash. This allows charger to begin charging battery again. If battery is not defective it should be able to be fully charged after being restarted. After sufficient time has lapsed the **GREEN** charge LED Indicator will blink confirming when / if battery is now fully charged.

Note: If attempting to charge more than one battery at a time it is very likely the charger will need to be restarted as described in order to completely charge multiple batteries. We do not recommend charging more than one battery at a time without confirming the individual condition of each battery and monitoring the charging and batteries closely. A better solution is to charge each battery separately

using your BatteryMINDER model 24041-AA-S3 and then connect them together, if desired for long term maintenance-float charging. We suggest your reading the Detailed Specifications on pages (29 - 33), including the additional LED indicator functions (pg. 14) not already covered above.

After carefully reading these instructions and Troubleshooting (pgs. 26 - 28) sections, should you still have questions, please e-mail our technical support department at:
techsupport@vdcelectronics.com.

Allow up to 3 business days for a detailed response to your questions. Always identify the model number of the product and revision letter of this manual contained on this page below. Without this information we may not be able to assist you correctly.

If your questions have already been answered in this manual you can expect a response referring you back to this manual and the specific page(s).

INSTRUCTIONS:
TEMPERATURE SENSOR Type: ABS-248
(At-the-Battery Sensor)

MANDATORY WHEN CHARGER IS USED WITH Sealed or Maintenance-type Aviation batteries, regardless of construction (AGM, Free-Electrolyte = filler caps)

Congratulations on purchasing the most advanced charger-maintainer-desulfator conditioner on the market today. Read your manual carefully to understand all of its features. Your charger came with the At-the-Battery Sensor ABS-248. Please read and fully understand all of the following before beginning your installation.

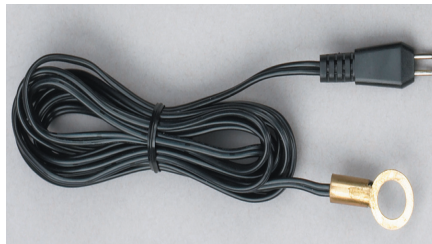
Your temperature sensing system is made up of two components. The thermal sensor w/ ring terminal and male plug w/ dust cover both shown below with extension cord attached. This cord then attaches directly to the mating female receptacle located on the charger

Do NOT modify by extending or shortening the extension cord.

Attaching the temperature sensor with extension cord

Your first choice should be to connect it to the Negative (-) post (clamp / screw) of the battery. This is the best location to sense the temperature of the battery.

The second choice is to place it as close to the battery as possible. Attachment of the sensor to the side or top of battery is also a possible option, under the right circumstances. Be careful to ensure it will not come loose in service.



Finally, if placing the sensor on the battery is not practical, place it where the ambient temperature the battery is exposed to (surrounded by) can be sensed. Installed properly, your charger is set to provide your battery with what it needs to out-live and out-perform any similar battery used in the same application-conditions by a factor of two (2).

Temperature has a direct effect on the life of a battery. The design life of the battery is based on an average annual temperature of 25°C (77°F). As the temperature increases above 25°C (77°F), the life of the battery decreases. The chart below shows the effects of temperature.

Effects of Temperature on Battery Life*		
Maximum Annual Average Battery Temperature	Maximum Battery Temperature	Percent Reduction in Battery Life
25°C (77°F)	50°C (122°F)	0%
30°C (86°F)	50°C (122°F)	30%
35°C (95°F)	50°C (122°F)	50%
40°C (104°F)	50°C (122°F)	66%
45°C (113°F)	50°C (122°F)	75%
50°C (122°F)	50°C (122°F)	83%

For example: If a battery's design life is 10 years at 25°C (77°F), but the average battery temperature is 35°C (95°F), the life of the battery will be only 5 years a 50% decrease.

*GNB Industrial Power, A Division of Exide Technologies, Section 92.30 Part No. Z99-Mar/Sep I&O REV 10/01

The chart below shows the need to regulate the output voltage of the charger to ensure against over or under charging your battery over a wide range of temperatures. Using your At-the-Battery Sensor will accomplish this better than any other known method.

AGM and Flooded (wet-cell) Charge and Float Voltages at Various Temperature Ranges**			
Temp °F	Optimal Charge	Optimal Float	Temp °C
≥ 120	28.00	26.00	≥49
110 – 120	28.40	26.20	43 – 49
100 -110	28.60	26.40	38 – 43
90 – 100	28.80	26.60	32 – 38
80 – 90	29.00	26.80	27 – 32
70 – 80	29.40	27.20	21 – 27
60 – 70	29.70	27.70	16 - 21
50 – 60	30.00	28.10	10 - 16
40 – 50	30.40	28.50	4 - 10
≤ 40	31.00	28.90	≤4

Notes:

MAINTAINING MULTIPLE BATTERIES

BatteryMINDer 24041-AA-S3 maintenance charger Desulfators can be used to **maintain** up to three 24-volt batteries at a time, providing each battery is fully operational (no dead-dying cells), free of sulfate and meeting the minimum full charge “rested” (see pg. 9) voltage of 2.13 volts / cell, after being fully desulfated.

ALL batteries MUST be properly tested to ensure they are in good condition (no dead-dying cells or excessive sulfation) before maintaining them in multiples. Only healthy, fully desulfated batteries should ever be MAINTAINED in sets of 2 or more. Test using an accurate, DIGITAL type ONLY, voltmeter. The Minimum voltage Must not be less than 25.56 volts after fully charging battery and letting it “rest” for 12 hours minimum, before testing. If battery voltage is less than 25.56, you must first desulfate it until you reach a “rested” (see pg. 9) voltage of 25.56 volts.

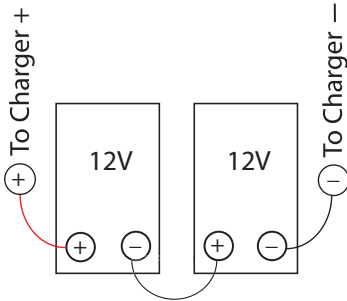
Remember, you must desulfate each battery by itself (one at a time) before maintaining them for extended periods. Attempting to desulfate more than one (1) battery at a time will yield very poor results, as the strongest (healthiest) and not the weakest (most sulfated) battery will receive the majority of the desulfation pulse energy.

ALWAYS test each individual battery to be certain it is healthy and free of sulfate before attempting to charge or maintain them, either as a single battery or in sets. **NEVER connect multiple batteries together for charging purposes using less than #18 Gauge insulated wire.**

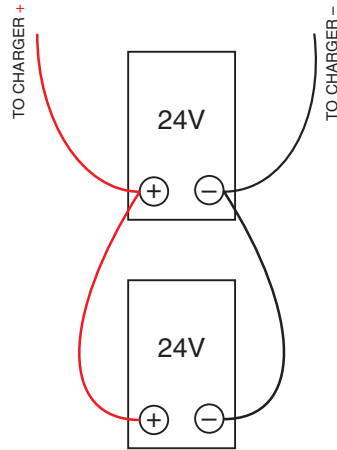
VDC Electronics, Inc. does not make nor can it supply or recommend, any type of wire harness to connect individual batteries for the purpose of charging them in groups, due to the many battery terminal sizes and configurations that exist.

See diagram (adjacent) for the most common multiple battery configuration.

**24041-AA-S3
24 Volt BatteryMINDER
Battery Configuration**



**12 VOLT
(Series Connected) = 24V**



**24 VOLT
(Parallel Connected) = 24V**

Troubleshooting - Model 24041-AA-S3

We use the word “Indicator” to mean the various LEDs (Light Emitting Diodes) showing the various faults, modes, and conditions of the battery and / or charger.

The words “unit”, “charger” or “recharger” means your model 24041-AA-S3 BatteryMINDER

PROBLEM:

Power ON indicator does not light

SOLUTION:

Check electrical outlet. If controlled by a wall switch be sure switch is on and try to prevent accidental shutting it off while charger is working.

PROBLEM:

ERROR indicator lights **RED** (several possibilities can be the cause)

SOLUTION:

1. Output leads - connections to battery may be reversed. Switch (reverse) connections at battery
2. If still remains **RED** check battery voltage. If 3-Volts or less battery may be damaged and should not be recharged. If battery was just recently removed from a load (lights, electronic equipment) or not used for extended time without a charger-maintainer, allow battery to “recover” by letting it “rest” without a load. If battery is healthy and just deeply discharged it should recover its voltage (rise above 6 volts) sufficiently to allow charger to begin an attempt to fully recharge it. If after battery has “rested” (see pg. 9) it may not be able to be recovered – recharged. It should be safely discarded – recycled.

PROBLEM:

ERROR Indicator lights **RED** and is **blinking**.

SOLUTION:

1. Battery(s) may be weak, heavily sulfated, or too large to fully charge before unit times out. Allow battery to remain in Maintenance-Float mode for 72 hours or more and then attempt to recharge again.
2. Battery may be so large it may require a second full recharge. Repeat recharge by pressing and holding Stop/Restart for 5 sec. until ALL LEDs light. Press Stop/Restart button to begin full recharge.
3. If recharging multiple batteries, 2 or more complete recharge cycles may be needed. Repeat full recharge by pressing Stop/Restart button again. If still **RED**-blinking, you may need to charge each battery separately.

PROBLEM:

Battery Condition Indicator lights **YELLOW**

(After battery has been completely charged)

SOLUTION:

Battery still has an unacceptable level of sulfation and must stay connected to charger and remain in Maintenance-Float mode (**GREEN** blinking indicator) for 72 hours or longer. Then stop charger by pressing Stop/Restart button and observe Indicator. If still **YELLOW** repeat (up to 3 full cycles) or until indicator lights **GREEN**.

PROBLEM:

Battery Condition Indicator lights **YELLOW** (May be several causes) (Before battery is completely charged)

SOLUTION.

Battery can be weak due to sulfation, self discharge or was very

deeply discharged.

Attempt a full recharge and recheck after completion. If still **YELLOW** follow procedure for (After battery has been completely charged.)

PROBLEM:

Error and Charge LEDs blink simultaneously

SOLUTION:

Charger has timed out before battery has completely charged. Reset unit. Repeat reset - full recharge by pressing Stop/Restart button and holding it down until ALL LEDs flash. Press Stop/Restart button to begin full recharge.

DETAILED SPECIFICATIONS - VDC Model No. 24041-AA-S3

MCU controlled H.F. Battery Charger

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Electrical Parameters		
	24041-AA-S3	E24041-AA-S3
Input Voltage	90-140 VAC	220-240 VAC
Input Frequency	50/60 Hz	50Hz
Unloaded Input Current	80mA AC	80mA Ac
Input Current Consumption at Full Output (UL1236)	1A AC	1A AC

DETAILED SPECIFICATIONS
VDC Model No. 24041-AA-S3 (con't.)

- Charging Output Control Characteristics
- Charging Flow:
Battery condition detect>Soft Start Charge>Bulk Charge>Absorption Charge>Sulfate Check>Float Charge
- Soft Start Charging Activity conditions:
Battery Voltage is over 6 Vdc and less than 21Vdc
- Soft Start Charging output current control:
1 \pm 0.25 Adc
- Soft Start Charging Time Limited:
(Stops charge if battery cannot be charged over 21.0-V after 6 hrs, Error LED flash indicated) 6 \pm 0.25 Hours
- Bulk Charging Activity conditions:
Battery Voltage is over 21Vdc
- Bulk Charging Current control:
4 +0.22 / -0 Adc
- Max. rated output voltage and current:
29.4-V at 4Adc
- Bulk Charging Time Limited:
(Stops charge if battery cannot be fully charged [29.4-V*] after 20 hrs, error LED flash indicated) 20 \pm 1 Hours

*At 25°C

DETAILED SPECIFICATIONS
VDC Model No. 24041-AA-S3 (con't.)

Absorption mode transitions to Float mode conditions in AGM setting:

Mode: 1) Charging current

2) 5 Hours Time-out: after 5 Hours unit switches to Float Charge Mode

Absorption mode Thermal Runaway Protection: Stops Charging when the second current sample is

larger than the first current sample (Positive di/dt)

GREEN Charge - Float LED will blink

Float Charge output Voltage control 27.2 ± 0.25 Vdc

Float Charge current control (4A Rate) 2 Adc ± 0.25

Float charge transitions to PWM Float Charge Mode after 1 Hour

Float Pulse Charge voltage control $27.2 @ 25^\circ\text{V} \pm 0.25$ Vdc

Float Pulse Charge current control: (4A Rate) 2 Adc ± 0.25

**DETAILED SPECIFICATIONS
VDC Model No. 24041-AA-S3 (con't.)**

Battery sulfation check period (After absorption charge is finished): 10 minutes

Unloaded output voltage when battery is disconnected: 0.5 Vdc (max.)

Output short-circuit current when battery disconnected: 5mA dc (max.)

Battery flow back current (to the charger) when connected to 24V battery, AC Power disconnected:

30 (max.) mA dc

All LED indicators will shut off if AC power is disconnected for 5 Minutes

Full time Desulfation output pulse current control $I_{p-p} \pm 3 \text{ A}_{dc}$

Full time Desulfation output PWM* frequency $100 \pm 10 \text{ Hz}$

Full time Desulfation duty 0.3%

*Pulse Width Modulated

Temperature Compensation (with ABS-248 Battery Temperature Sensor) detailed on pages 21 -23.

DETAILED SPECIFICATIONS
VDC Model No. 24041-AA-S3 (con't.)**Transformer**

Transformer Type: Ferrite core transformer

Rising Temperature of Transformer: 80°C Max.

Insulation

Primary to Secondary insulation Test: 1240 Vac 50Hz/60Hz with 1 minutes, 10mA ac no break down found

Primary to core insulation test: 1240 Vac 50Hz/60Hz with 1 minutes, 10mA ac no break down found

Secondary to core insulation test: 500 Vac 50Hz/60Hz with 1 minutes, 10mA ac no break down found

Electrical Cable

Input Lead and plug specifications :CUL SJT 18AWG X2 with UL 2-pin plug, External Length 6 ft

Output lead : 1015 105°C VW-1 16AWG with Trailer connector, External Length 6 ft

Extension cord: 1)1015 105°C VW-1 16AWG with Trailer connector & battery clamp, External Length 6 ft

2)1015 105°C VW-1 16AWG with Ring terminal & blade type Fuse, External Length 6 ft

Thermal Sensor Extension Cord: 11'8"

Ring terminal I.D. dimensions Negative 8mm, Positive 10mm

Physical Parameters

Weight: 2.2 lbs.

Plastic enclosure material: UL-94V0 #1 Noryl or #2 PC+ABS #3 PC

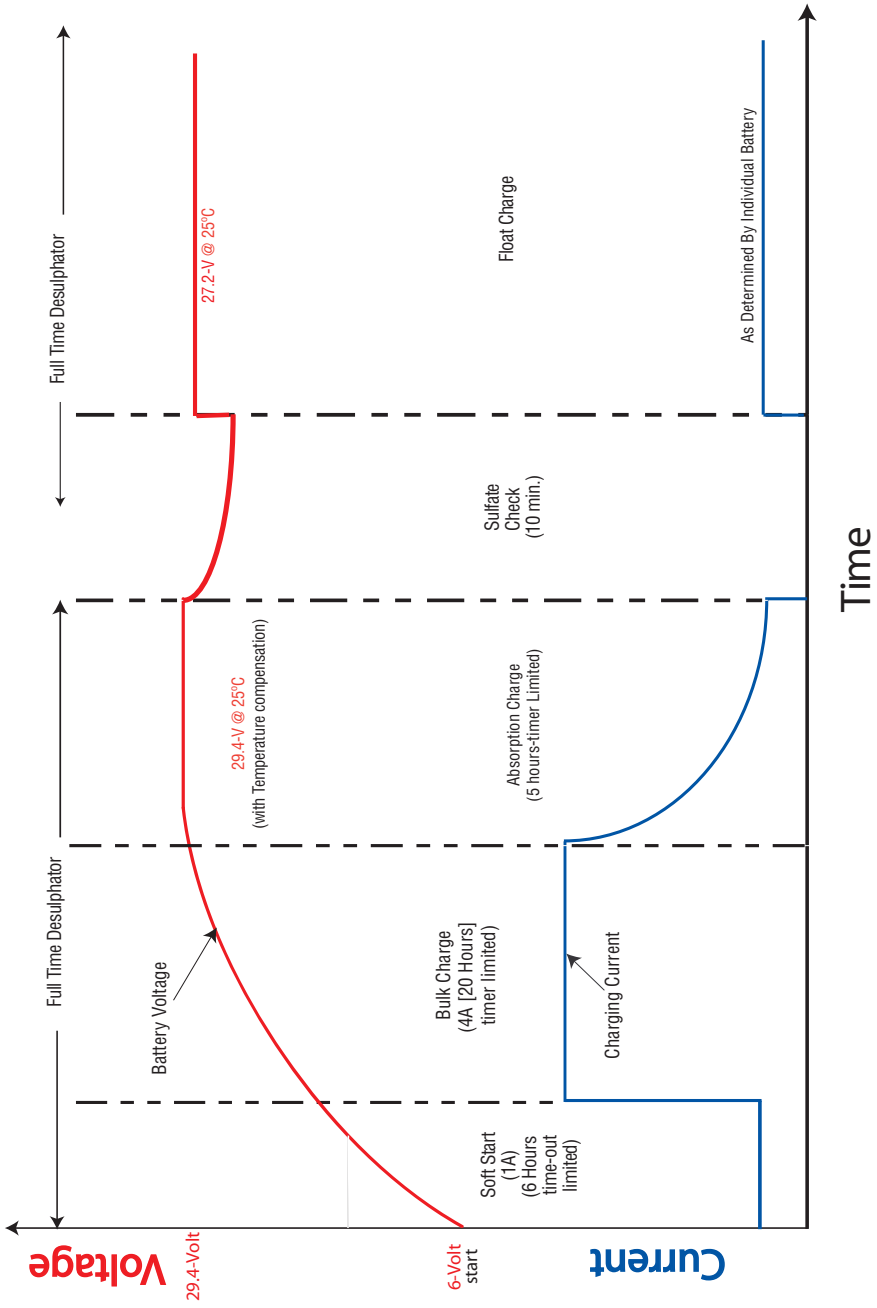
Enclosure Dimension: Approx. 5.713 (W) x 5.516 (L) x 2.86 (H) inches

Environmental Characteristics

Operating temperature : -10° to 40°C

Storage temperature : -10° to 80°C

Operating Humidity range: 0 to 95% RH



ALL returns must be authorized by VDC Electronics after speaking to a VDC Electronics technician at 800-379-5579 x206 (ET). Please see our “Repair or Replacement” section of this manual for additional information.

BatteryMINDER One-Year 100% Unconditional Money-Back Guarantee

This BatteryMINDER product is guaranteed to perform as claimed or WE will refund your full purchase price, including all taxes, shipping or handling cost applicable to the purchase.

Unit must be returned freight prepaid together with Proof of Purchase directly to VDC Electronics, Inc., NOT TO THE DEALER FROM WHICH IT WAS PURCHASED.

BatteryMINDER Five-Year Limited Warranty

VDC Electronics, Inc. warrants this product for FIVE years from date of purchase at retail against defective material or workmanship and will be repaired or replaced at no charge. We make no warranty other than this limited warranty and expressly exclude any implied warranty including any warranty for consequential damages. This limited warranty is not transferable.

Unit must be returned freight prepaid together with Proof of Purchase directly to VDC Electronics, Inc., NOT TO THE DEALER FROM WHICH IT WAS PURCHASED.

IMPORTANT NOTICE

BatteryMINDER® Five-Year Warranty Registration Reminder

Online Registration:

<http://www.batteryminders.com/register>

Please register your unit online within 10 days of purchase. **Due to the ever-changing technology associated with this BatteryMINDER® unit, we may be unable to keep you apprised of significant upgrades, changes, etc. without your registration.** The information you provide upon registration will be used to keep a record of your purchase and will assist in providing support should you ever need to contact our

Technical Service department:

techsupport@vdcelectronics.com; 800-379-5579 x206 (ET).