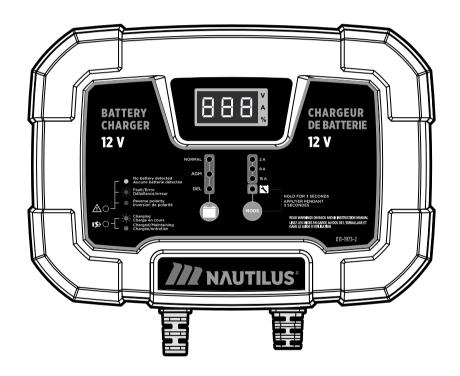


Battery Charger



Model no. 011-1973-2

IMPORTANT SAFETY INSTRUCTIONS. SAVE THESE INSTRUCTIONS.

This manual contains important safety and operating instructions.

INSTRUCTION MANUAL

Model no. 011-1973-2 | Questions? Contact us 1-888-942-6686



IF ANY PARTS ARE MISSING OR DAMAGED, OR IF YOU HAVE ANY QUESTIONS, PLEASE CALL OUR TOLL-FREE HELPLINE AT 1-888-942-6686.



Read and understand this instruction manual thoroughly before using the product. It contains important information for your safety as well as operating and maintenance advice. Keep this instruction manual for future use. Should this product be passed on to a third party, this instruction manual must be included.



This MotoMaster Nautilus product carries a three (3) year warranty against defects in workmanship and materials. At its discretion, MotoMaster Canada agrees to have any defective parts(s) repaired or replaced free of charge, within the stated warranty period, when returned by the original purchaser with proof of purchase. This product is not guaranteed against wear or breakage due to misuse and/or abuse.

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SAFETY

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INTRODUCTION

This MotoMaster Nautilus® Battery Charger features advanced technology that makes battery charging faster, easier, and safer while helping to maximize the performance and life of your batteries.

This battery charger is designed for use on all types of 12-volt lead-acid batteries including Wet (flooded), Maintenance-free (MF), Calcium (Ca), Enhanced Flooded (EFB), Absorbed Glass Mat (AGM), and Gel. It is suitable for charging batteries rated from 10 to 300 Amp-hours and maintaining batteries from 10 to 500 Amp-hours.

This manual will explain how to use the charger safely and effectively. Please read and follow these instructions and precautions carefully.

IMPORTANT SAFETY INSTRUCTIONS SAVE THESE INSTRUCTIONS.

- Read all instructions, warning, and cautions printed on the battery charger, battery and vehicle or equipment using battery.
- DO NOT expose charger to rain or snow.
- Use of an attachment not recommended or sold by the battery charger manufacturer may result in a risk of fire, electric shock, or injury to persons.
- To reduce risk of damage to electric plug and cord, pull by plug rather than cord when disconnecting charger.
- An extension cord should not be used unless absolutely necessary.
 Use of an improper extension cord could result in a risk of fire and electric shock. If an extension cord must be used, make sure:
 - The pins on plug of extension cord are the same number, size, and shape as those of plug on charger.
 - The extension cord is properly wired and in good electrical condition.
 - The wire size is large enough for the AC ampere rating of the charger, as specified in the chart on the following page.
- DO NOT operate charger with damaged cord or plug—replace the cord or plug immediately.
- DO NOT operate charger if it has received a sharp blow, been dropped, or otherwise damaged in any
 way—take it to a qualified serviceman.
- DO NOT disassemble the charger. Take it to a qualified service professional if service or repair is required. Incorrect assembly may result in fire or electric shock.
- To reduce risk of electric shock, unplug charger from outlet before attempting any maintenance or cleaning. Turning off controls will not reduce this risk.

WARNING-RISK OF EXPLOSIVE GASES

- WORKING IN THE 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.
- To reduce risk of battery explosion, follow these instructions and those published by battery
 manufacturer and manufacturer of any equipment you intend to use in the vicinity of the battery.
 Review cautionary markings on these products and on engine.

PERSONAL SAFETY INSTRUCTIONS

- Consider having someone close by to come to your aid when you work near a lead-acid battery.
- Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing, or eyes.
- Wear complete eye protection and clothing protection. Avoid touching eyes while working near battery.
- If battery acid contacts skin or clothing, wash immediately with soap and water. If acid enters eyes, immediately flood eyes with running cold water for at least 10 minutes and get medical attention immediately.
- **NEVER** smoke or allow a spark or flame in vicinity of battery or engine.
- Take extra precautions to avoid dropping a metal tool onto the battery. It may spark or create a short circuit that can cause an explosion.
- 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.
- 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.
- NEVER charge a frozen battery.

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AC ELECTRICAL CONNECTIONS

PLUGGING CHARGER IN

Your charger requires a 120 V AC electrical wall outlet receptacle installed according to local codes and ordinances.

USING AN EXTENSION CORD

An extension cord should not be used unless absolutely necessary. Use of an improper extension cord could result in a risk of fire and electric shock. If an extension cord must be used, make sure:

- The pins on plug of extension cord are the same number, size, and shape as those of plug on charger.
- The extension cord is properly wired and in good electrical condition.
- The wire size is large enough for AC ampere rating of charger as specified in the chart below:

MINIMUM RECOMMENDED EXTENSION CORD

Length of Cord, Metres (Feet)	AWG* Size of Cord
7.6 (25)	18
15.2 (50)	16
30.5 (100)	12
45.6 (150)	10

^{*}AWG= American Wire Gauge

PREPARING TO CHARGE

- If it is 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.
- Be sure area around battery is well ventilated while battery is being charged.
- Clean battery terminals. Be careful to keep corrosion from coming in contact with eyes.
- 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.
- Study all battery manufacturer's specific precautions while charging and follow recommended rates of charge.
- Determine voltage of battery by referring to car owner's manual and make sure that output voltage selector switch is set at correct voltage. If charger has adjustable charge rate, charge battery initially at lowest rate.

CHARGER LOCATION

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

DC CONNECTION PRECAUTIONS

- Connect and disconnect DC output clips only after removing AC cord from electric outlet.
 Never allow clips to touch each other.
- Attach clips to battery and chassis as indicated in the Connecting Your Battery section.

CONNECTING YOUR BATTERY

FOLLOW THESE STEPS WHEN BATTERY IS INSTALLED IN VEHICLE.
WARNING: A SPARK NEAR THE BATTERY MAY CAUSE A BATTERY EXPLOSION. TO REDUCE THE
RISK OF A SPARK NEAR THE BATTERY:

- Position AC and DC cords to reduce risk of damage by hood, door or moving engine part.
- Stay clear of fan blades, belts, pulleys, and other parts that can cause injury to persons.
- Check polarity of battery posts. POSITIVE (POS, P, +) battery post usually has a larger diameter than NEGATIVE (NEG, N, -) post.
- Determine which post of battery is grounded (connected) to the chassis.

 If negative post is grounded to chassis (as in most vehicles), see step "For negative-grounded vehicle". If positive post is grounded to the chassis, see step "For positive-grounded vehicle".
- 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-gauge metal part of the frame or engine block.
- 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-gauge metal part of the frame or engine block.
- When disconnecting charger, turn switches to off, disconnect AC cord, remove clip from vehicle chassis, and then remove clip from battery terminal.

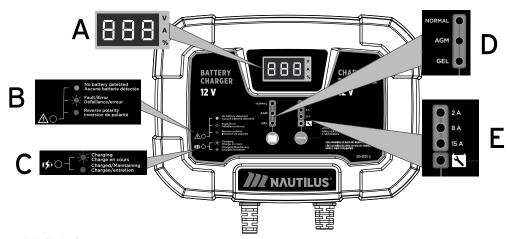
CONNECTING YOUR BATTERY



FOLLOW THESE STEPS WHEN BATTERY IS OUTSIDE VEHICLE. WARNING: A SPARK NEAR THE BATTERY MAY CAUSE A BATTERY EXPLOSION. TO REDUCE THE RISK OF A SPARK NEAR THE BATTERY:

- Check polarity of battery posts. POSITIVE (POS, P, +) battery post usually has a larger diameter than NEGATIVE (NEG, N, -) post.
- Attach at least a 24" (61 cm) 6-gauge (AWG) insulated battery cable to NEGATIVE (NEG, N, -) battery post.
- Connect POSITIVE (RED) charger clip to POSITIVE (POS, P, +) post of battery.
- 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.
- Do not face battery when making final connection.
- When disconnecting charger, always do so in reverse sequence of connecting procedure and break first connection while as far away from battery as practical.
- A marine (boat) battery must be removed and charged on shore. To charge it on board requires equipment specially designed for marine use.

CONTROLS AND INDICATORS



A. Digital Display

During charging, the digital display will alternate between Volts (V), Amperage (A) and Battery State of Charge (%). It can also display Fault Codes if a charging error is detected.

Volts—Actual charging voltage will be displayed. Charging voltage can reach up to 14.4 V—this is normal and required to effectively charge a 12-volt battery.

Amps—Actual charging amperage will be displayed. While you may select 2 A, 8 A, or 15 A charge modes, these are maximum currents and the battery charger will reduce actual current delivered to the battery based on feedback from the battery and other factors.

Stage of Charge—The approximate battery state of charge is displayed. A reading of "LO" indicates that the battery is below 50% state of charge. Above 50%, the percentage will display in 10% increments between 60 to 90% capacity. Once the battery is fullly charged, the display will read "100%".

NOTE: About 30 minutes after reaching full charge, the battery charger will enter a power-saving mode and the digital display will turn off.

Fault Codes—The charger will continuously monitor charge progress and collect feedback from the battery during charging. In the event an abnormal condition is detected, charging will stop and a fault code (e.g., "F01") may be displayed. (See "Troubleshooting/Fault Codes" for possible causes and solutions.)

NOTE: A fault condition will also be indicated by the LED illuminating.



CONTROLS AND INDICATORS

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This LED will light up if the charger detects a problem and can not proceed with charging.

- Amber (solid)—No battery detected. Check to ensure that clamp connections to the battery posts are clean and solid. If connections are good, the battery is severely discharged (<1.5 V) and may be unsafe to charge. The battery should be tested or replaced. (NOTE: "888" will also appear on the digital display)
- Red (blinking)—A fault has been triggered and charging has been aborted. Check the digital display for a Fault Code and see "Troubleshooting/Fault Codes" for possible causes and solutions.
- Red (solid)—Reverse polarity has been detected. Reverse clamp connections.

C. Charge Status Indicator

A blinking LED indicates the battery is charging. A solid LED indicates charging is complete and battery charger has entered the Maintain stage. (See "UNDERSTANDING the MULTI-STAGE CHARGING PROCESS" section.)

D. Battery Type

There are 3 battery types to choose from. Pressing the button repeatedly will cycle through each of the battery types. See below for an overview of each type.

NOTE: The battery charger will retain the last selected mode in memory. In the event AC power is disrupted (e.g., power failure), the charger will re-start in the last selected mode once power is restored.

BATTERY TYPE	EXPLANATION	
NORMAL (14.4 V)	For charging 12-volt Wet (flooded), Maintenance-free (MF), Calcium (Ca) and Enhanced Flooded (EFB) batteries as well as many AGM batteries.	
AGM (14.8 V)	For charging some 12-volt AGM batteries.	
GEL (14.1 V)	For charging most Gel batteries.	
For best results, check the charging recommendations on your battery or consult with the battery manufacturer.		

E. Charging Modes

There are 4 charging modes to choose from. Press the MODE button repeatedly to cycle through each of the regular modes. To select the special mode (RECONDITIONING), hold the MODE button for 3 seconds. Charging will automatically begin about 5 seconds after the charge mode has been selected.

NOTE: The battery charger will retain the last selected mode in memory. In the event AC power is disrupted (e.g., power failure), the charger will re-start in the last selected mode once power is restored.

MODE	EVDI ANATION	Battery Capacity Range	
	EXPLANATION	Charging	Maintenance
2A	For charging small to medium 12 V lead-acid batteries.	10 to 50 Amp-hour	10 to 400 Amp-hour
8A	For charging medium to large 12 V lead-acid batteries.	30 to 160 Amp-hour	30 to 500 Amp-hour
15A			50 to 500 Amp-hour
	For reconditioning 12 V lead-acid batteries suffering from capacity loss due to sulphation or stratification. USE WITH CAUTION—see instructions and precautions under Using Reconditioning Mode. 10 to 300 Amp-hour Not applied		Not applicable

CHARGING YOUR BATTERY

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Examples of Battery Sizes in Common Applications		
Small (10-25 Ah)	Motorcycle, scooter, ATV, personal watercraft, snowmobile.	
Medium (30-50 Ah)	Compact car, mid-size sedan, compact SUV, riding mower, UTV.	
Large (60-100 Ah)	Full-size car, large SUV, truck, boat, RV, farm tractor.	
Extra large (100 Ah+)	Large marine, tractor trailer, bus, multiple batteries connected in a bank.	
For reference only. Please check the specifications listed on your battery or consult with the battery manufacturer.		

CHARGING YOUR BATTERY

- 1. Connect the charger clamps to the battery (following the steps outlined in "Connecting Your Battery").
- 2. Plug the charger AC plug into an electrical outlet.

 NOTE: If a fault or error is detected, the LED will illuminate (see Charge Status Indicators).
- 3. Press the button to select battery type.
- 4. Press the MODE button to select a charging program.

NOTE: If no selection is made within 5-seconds, the charger will default to the last selection in memory and automatically begin charging.

- 5. Your battery is fully charged when the indicator turns solid green and the display reads "100%".
- 6. Stop charging at any time by disconnecting the charger AC plug from the electrical outlet.

Using Reconditioning Mode

If a lead-acid battery is left sitting in a low state of charge, or is deeply discharged, or is never given the opportunity to fully charge, it can suffer capacity loss due to sulphation and/or stratification. Such a battery can appear to have a normal open circuit voltage and yet it will have a noticeable drop in performance. Using Reconditioning mode may help to reverse the affects of sulphation and stratification, restoring lost battery capacity.

To maximize battery life and performance, Recondition your battery once per year or after deep discharges. For best results, take the battery through a normal full charge cycle before using this mode. A Reconditioning charge can take up to 4 hours to complete.

CAUTION: USE THIS MODE WITH CARE. RECONDITIONING USES A HIGH CHARGING VOLTAGE AND MAY CAUSE WATER LOSS IN THE BATTERY. IT IS BEST SUITED FOR WET (FLOODED) BATTERIES WITH REMOVABLE VENT CAPS WHICH ALLOWS FOR WATER LEVELS TO BE TOPPED UP. RECONDITIONING IS NOT RECOMMENDED FOR AGM OR GEL BATTERIES. TO MINIMIZE RISK OF HIGH VOLTAGE TO SENSITIVE ELECTRONICS, DISCONNECT THE BATTERY FROM THE VEHICLE (OR ANY OTHER EQUIPMENT) WHEN USING THIS MODE.

UNDERSTANDING FACTORS THAT AFFECT CHARGING TIME

The time it takes to fully recharge a battery depends on several factors including:

1. Battery Depth of Discharge

The greater the depth of discharge, the longer it will take to fully charge a battery. For example, a battery discharged to a level of 50% will take about twice as long to fully charge than a battery discharged only 25%.

2. Battery Size

If charged at the same current, a larger (higher capacity) battery will require more time to fully charge than a smaller (lower capacity) battery. This difference can be overcome by charging larger batteries at a higher current.

3. Battery Age and Condition

As a battery ages, its internal resistance will increase, impacting its ability to accept current. This effect is particularly noticeable in batteries that have not been well-maintained over their life.

4. Battery Type

Some battery chemistries, such as AGM and gel, have lower internal resistance which means they can accept charge better without generating damaging heat. Such batteries can charge up to 2 times faster than traditional wet battery types.

UNDERSTANDING THE MULTI-STAGE CHARGING PROCESS

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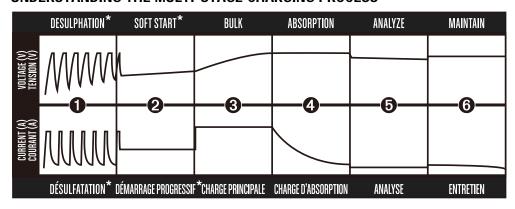
5. Charge Rate

The charge rate is measured in amperes (A). A battery charged at a lower rate will take longer to fully charge than a battery charged at a higher rate. This does not mean that one should always charge a battery at the highest ampere available as this can cause overheating and premature battery failure. A battery should be charged at a rate appropriate for its size—a good, safe rule of thumb is about 1/10th its Amp-hour capacity (e.g., 100 Ah battery x1/10=10 A).

6. Cold Temperature

Cold temperatures slow down the chemical reaction that takes place inside a battery when it is charging. Charging a battery at a cold temperature can greatly increase the amount of time required to charge the battery. Ideal charging temperature is between 10 to 25°C (50 to 77°F).

UNDERSTANDING THE MULTI-STAGE CHARGING PROCESS



STAGE 1 DESULPHATION*

Pulses of voltage and current help recover sulphated or deeply discharged batteries.

STAGE 2 SOFT START*

Gently introduces current to condition deeply discharged batteries and prevent overheating that could damage the battery.

STAGE 3 BULK

Charging with maximum current to bring the battery to about 80% capacity.

STAGE 4 ABSORPTION

Charging with constant voltage while reducing current to safely bring the battery to 100% capacity. This stage is key to maximizing battery performance and battery life.

STAGE 5 ANALYZE

Tests if battery is holding charge.

STAGE 6 MAINTENANCE

Monitors battery voltage and provides top-up charging when necessary to keep battery fully charged.

MAINTENANCE AND CARE

- Wipe clean cords and clamps after each use.
- Store the power and output cables neatly to prevent damage.
- The charger housing may be cleaned using a damp cloth and mild cleaning agent.
- Always unplug the charger when not in use.
- Keep the charger stored in a cool, dry place.

TROUBLESHOOTING/FAULT CODES

Error Code	Condition	Cause	Solution
888	The charger does not detect a battery connected to it.	Charger does not recognize the battery.	Connect battery to charger BEFORE connecting charger to AC power.
		Poor clamp connection.	Ensure battery posts are clean. Rock clamps back and forth on battery posts to ensure a good connection.
		Battery voltage is under 1.5 V (battery must have a MINIMUM of 1.5 V to activate charger).	Check battery voltage with a volt meter. If LESS than 1.5 V, replace battery. (A battery with less than 1.5 V is likely beyond salvage due to extreme sulphation or some other internal failure.) You may try to boost the battery using booster cables connected to another vehicle. This may raise the battery voltage above 1.5 V allowing the battery charger to activate.
The battery voltage is less than 10 V after some time charging.	, , ,	The battery is defective.	Replace the battery.
		A load may be connected to the battery.	Do not use the battery during charging.
F02	Battery voltage is too high.	Battery is not a 12 V battery.	Confirm that the battery is 12 V, not 24 V.

^{*} If necessary

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Error Code	Condition	Cause	Solution
F03	Actual charge rate exceeds selected charging rate.	A load may be connected to the battery.	Disconnect the load and attempt to charge again.
		Charger error.	Disconnect the battery and the AC power; attempt to charge again.
FOY	The temperature of the charger is too high.	High ambient temperature or poor ventilation.	Ensure adequate ventilation. The charger will resume charging after cooling.
FOS No di	The battery does not go into Maintenance mode after being charged for 24 hours. Note: When F05 appears, disconnect charger from AC power and battery, then reconnect and attempt to charge again.	The charge current is too low.	Try charging battery again using a higher charge rate.
		There is a load placed on the battery while charging.	Remove any loads connected to the battery during charging.
		Battery is defective and will not accept a charge.	Replace battery.
F05	Reverse polarity.	The battery clamps are incorrectly connected.	Reverse clamp connections.

TECHNICAL SPECIFICATIONS

Input Voltage AC	120 V AC, 60 Hz	
Working Voltage AC	104-127 V AC, 60 Hz	
Input Amps	6.5 A (max.)	
Charging Voltage	NORMAL: 14.4 V AGM: 14.8 V GEL: 14.1 V RECONDITIONING: 15.8 V	
Charging Current	CHARGING: 2/8/15 A	
Minimum Battery Voltage	1.5 V	
Ambient Operating Temperature	-20 to 40°C (-4 to 104°F)	
Charger Type	6-step, fully automatic	
Compatible Battery Voltage	12 V (nominal)	
Compatible Battery Types	All lead-acid (Wet, MF, Ca, AGM and Gel)	
Compatible Battery Capacities	Charging: 10 to 300 Amp-hour Maintenance: 10 to 500 Amp-hour	
Dimensions (L x W x H)	7 7/8 x 4 15/16 x 8 11/16" (20 x 12.5 x 22 cm)	
Weight	2 lb 9 oz (1.15 kg)	

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