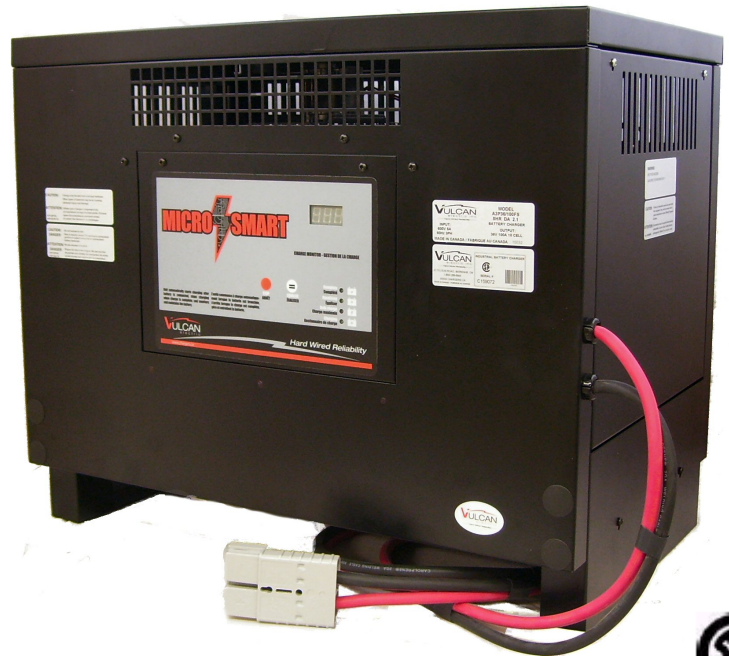




Hard Wired
Reliability

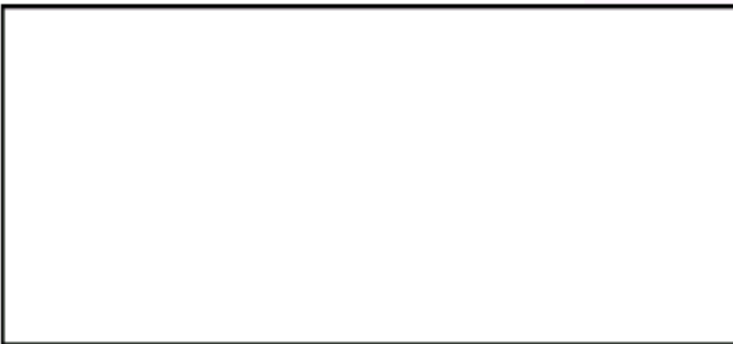
Installation and Operation Manual

A2P Single Phase Automatic Industrial Battery Charger



Featuring

MICRO SMART



VULCAN
electric inc.
— Hard Wired Reliability —

205B Konrad Cres., Markham, ON, L3R 8T9
www.chargers.ca
“Building Canada’s toughest battery chargers
for over a century.”

Congratulations on your purchase of a Vulcan MICRO-SMART Industrial Battery Charger!

Vulcan Electric's Model A2P is a microprocessor based charger that's designed to charge lead acid batteries used in forklifts and industrial trucks.

Operating Features

- **Automatic Self Starting**

Simply connect to a battery to begin charging.

- **Automatic Bulk Charge Cycle**

The A2P begins charging in a Bulk Charge Cycle, controlled by both time and voltage, and automatically ends this cycle once the battery achieves an 80 per cent State of Charge (SOC).

- **Automatic Finish Charge Cycle**

The A2P automatically switches to its Finish Charge Cycle as soon as the battery reaches 80 per cent SOC, and terminates the cycle when full charge is reached.

- **Equalize Function**

The manually activated Equalize function will double the time of the Finish Charge Cycle, effectively equalizing the battery.

- **Stop Function**

The clearly marked control panel found on the front of the charger includes a Stop button used to manually terminate the charging cycle – ensuring the battery can be safely disconnected.

- **Charger Temperature Sensor**

The charger will automatically shut off if it detects excessive internal temperatures.



Standard Features

- Transformer wound with high-temperature copper magnet wire.
- A standard high ampere rated SB connector.
- Fin type extruded aluminum heat sink to properly dissipate heat.
- Heavy duty, stud mount diodes.
- Compact cabinet made using galvanized 18 Gauge steel.
- Hinged front access panel.
- Thermally protected fan.
- Clearly marked analog ammeter, accurate to within five per cent, to monitor the output of the charger; digital ammeter available.
- DC circuit breaker protection.
- Heavy duty AC mains contactor.
- Construction using readily available North American components.
- Auto restart in the event of a loss of AC voltage.
- Five year limited warranty.
- Toll free help line at 1-800-268-6949.
- Cross Canada support network of parts and service people.
- Canadian made since 1896.

Charger Installation Procedures



WARNING: The following procedures must be followed exactly to avoid injury, fire, or risk of electric shock.

Inspect your charger thoroughly prior to installation to ensure that the unit is not damaged and that parts have not loosened during shipping. Inspect the product nameplate and cross reference the information with the packing slip and your order to ensure you have received the correct charger.



Mount the charger in a dry location that is free from vibration and offers sufficient ventilation. Slots and openings have been added to the cabinet for the purpose of ventilation. To ensure reliable operation of the charger, and to prevent it from overheating, these openings must not be blocked or covered.

Install the battery charger on a floor of **NON-COMBUSTIBLE MATERIAL** such as stone, brick, concrete or metal. If this is not available, install the charger on a floor plate of at least 1.43 mm galvanized steel -- or a floor plate of at least 1.6 mm uncoated steel -- that extends 150 mm beyond all sides of the equipment.

The charger should never be placed near or above a source of heat. Nor should it be placed in a built-in installation unless proper ventilation has been provided. Do not install electronic or electrical equipment, including the battery charger, in a battery compartment.



All wiring must be completed in accordance with ALL applicable federal and local electrical codes to ensure a safe installation. Only qualified personnel should attempt to install this product.

A. GROUNDING

A terminal marked, "GRD" is provided for the charger to be grounded. Do not operate this unit in an ungrounded state. (Refer to Illustration 1, component "A" to locate this component.)

B. AC INPUT CONNECTION



WARNING: This product is not equipped with AC input fuses, and requires external AC fuses. Be sure to install an appropriately rated AC fused disconnect on the input. Refer to the product name plate for input voltage and current. Only qualified personnel should attempt to install this product.

1. Conduit knockouts are provided on two sides of the cabinet.
2. Route the input wiring and ground wire to the **Terminal Block** marked L1 L2. (Refer to Illustration 1, Component "B" to locate this component.)

C. DC OUTPUT SET-UP

The factory has pre-set your charger to the requested AC input voltage to ensure the correct output of DC amps. Refer to the tag on the input terminal block to determine the factory setting.

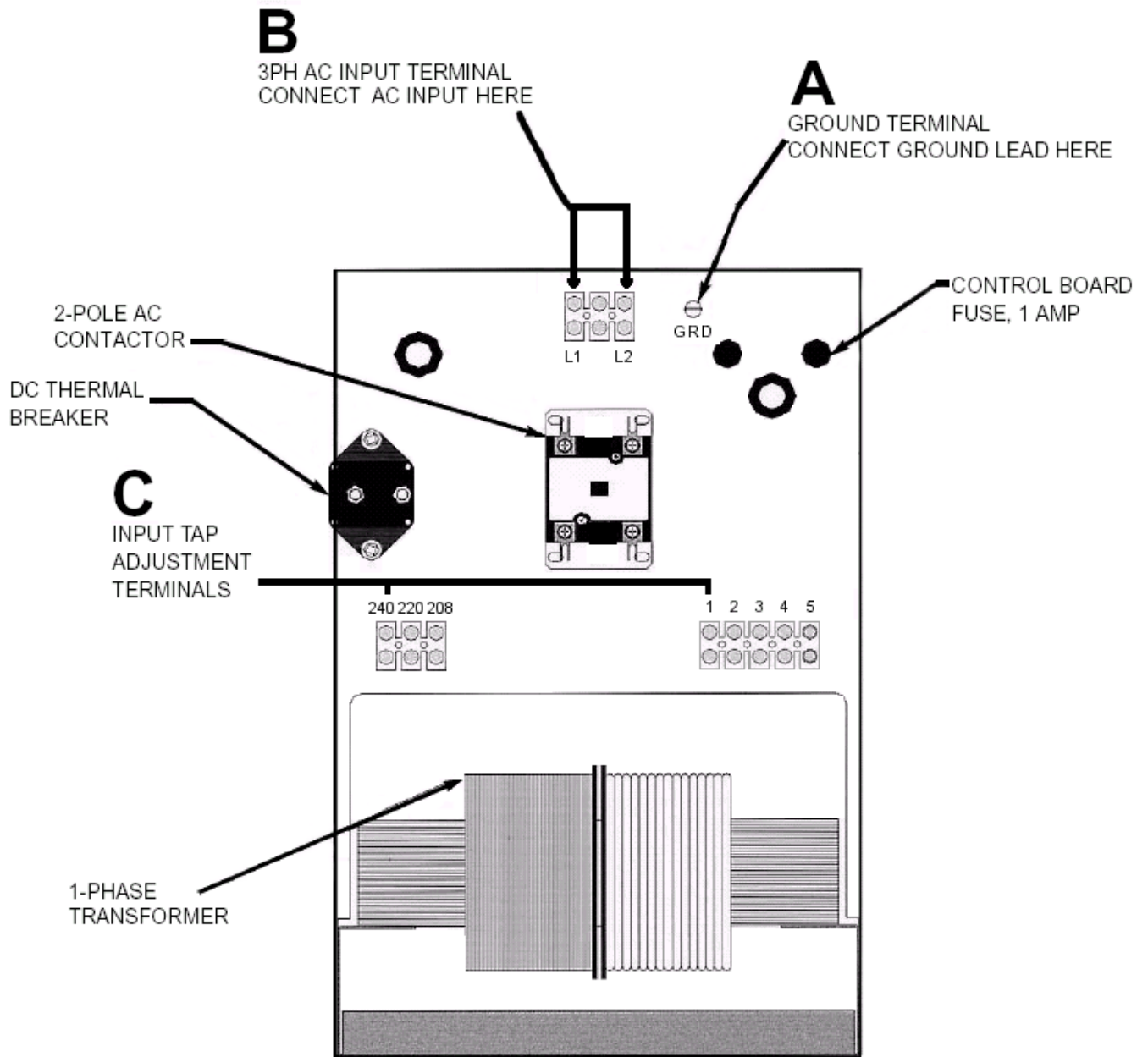


Warning: Failing to follow this procedure may result in a lower or higher charger output than desired. Improper settings may cause a fire and/or severe damage to the charger and battery. Only qualified installers should attempt this procedure.

Verify the correct AC input prior to using the charger, to ensure the correct DC output. Use the following procedure to ensure the correct setting of the charger:

1. Read the AC input voltage using a voltmeter.
2. Refer to Illustration 1, Component "C" to locate the taps. Verify that the tap is connected to the correct terminal.
3. If an adjustment is necessary, relocate the AC input tap coming from the **Two-Pole AC Contactor** to the appropriate tap.

Illustration 1: Installation-Related Components



Normal Operation



Fig. 1

Bulk Charge:

Once connected to a battery, the charger detects the battery's voltage. If the battery is at less than 80 per cent of its full charge, the charger will begin charging in the Bulk Charge Cycle. The **red "Bulk Charge" LED** and **green "Charging" LED** will be visible at the same time (Fig. 1). The ammeter will display the output of the charger.



Fig. 2

Finish Charge:

1. Once the battery has achieved 80 per cent of its full charge, it will switch to the Finish Charge Cycle. Only the **green "Charging" LED** will be visible (see Fig. 2). The charger is now in Absorption Mode, which will continue for a time that has been pre-set by the factory.



Fig. 3

2. As soon as the Finish Cycle is complete, the charger will shut off. Only the **green "Complete" LED** will be visible (see Fig. 3).

The Control Panel:

The control panel found on the front of your charger includes indicator LEDs, a Stop button, an Equalize button, and an ammeter to monitor the charge progress.

Stop Button:

A manual Stop button is also provided on the control panel, to stop the charger during the charge cycle. This button should be pressed before safely disconnecting a battery that has not been completely charged. To re-start, reconnect the battery.

Equalize Button:

An Equalize button provided on the front panel allows users to choose an Equalize Cycle. The Equalize button must be pressed during the Bulk Charge Cycle (see Fig. 4) to initiate the Equalize Cycle. The charger will automatically shut off after the Equalize Cycle is complete. The Equalize Cycle will be indicated with a **yellow "Equalizing" LED**, a **red "Bulk Charge" LED**, and a **green "Charging" LED** (see Fig. 5).

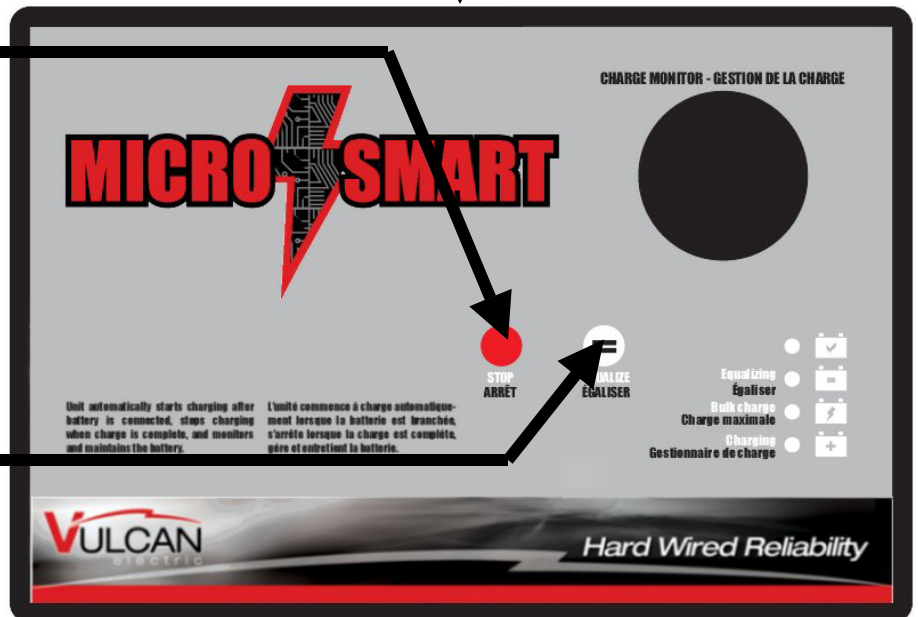
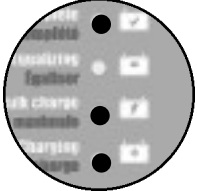
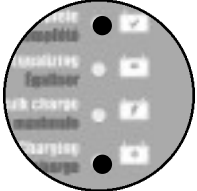
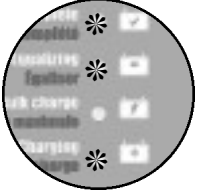
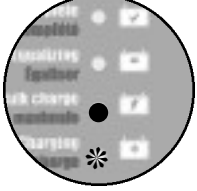
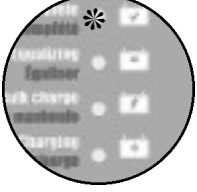
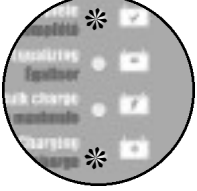


Fig. 4
Bulk Charge Cycle.
Equalize mode
can be initiated.



Fig. 5
Equalize Cycle
has been initiated.

Troubleshooting Guide

Control panel ● Steady Light ✱ Flashing Light	Indicates	Action required Battery and electrical service should always be conducted by qualified electrical personnel!
 <p>Charge Cycle Repeating</p>	Charger is repeating a Bulk Charge Cycle because battery voltage has dropped over time.	<ul style="list-style-type: none"> • Some drop in voltage can be expected over time, requiring Bulk Charge Cycle to repeat. • Check condition of the battery. • No further action required.
 <p>Finish Charge Cycle Repeating</p>	Charger is repeating a Finish Charge Cycle, because battery's voltage has dropped over time.	<ul style="list-style-type: none"> • Some drop in voltage can be expected over time, requiring Finish Charge Cycle to repeat. • Check condition of the battery. • No further action required.
 <p>Battery Voltage Too Low or Too High</p>	Battery voltage is too low or too high for the Charge Cycle to begin.	<ul style="list-style-type: none"> • Verify battery's nominal voltage rating is appropriate for the charger. (ie 36V battery and 36V charger.) • If battery's nominal voltage rating is correct, but battery has discharged below normal starting parameters, push and hold Stop Button for up to 60 seconds. Charger will deliver Boost Charge that will shut off once button is released. Charger should re-start within 15 seconds after the button is released. • If LEDs flash again, you may repeat the Boost process. • If Charge Cycle still won't begin, battery voltage is beyond acceptable parameters, and battery may require service by qualified personnel.
 <p>Bulk Mode Extended</p>	Charger is in Extended Bulk Mode because battery has not reached proper voltage during Bulk Charging Cycle.	<ul style="list-style-type: none"> • Battery may require service. • Qualified electrical personnel should check building's Input Voltage, which may be lower than charger's Tap Settings. • Ensure proper terminal and connector contacts. • Ensure battery is sized for charger output.
 <p>Battery Did Not Reach Finish Voltage</p>	Charge Cycle complete. Battery did not reach Finish Voltage, and charger will not allow a re-start.	<ul style="list-style-type: none"> • Qualified electrical personnel should inspect battery, and verify its AH rating matches charger's output. (The battery may be too big for the charger.) • Qualified electrical personnel should verify charger's Input Taps match Input Service. (See Installation Procedures.)
 <p>Charge System Failure</p>	Charge System Failure. Electronic Controls have detected that the charger continues to run even though controls have attempted to shut it down. (Probable cause: Faulty Contactor.)	<ul style="list-style-type: none"> • Disconnect battery. • Shut down AC input. • Call for service. • Inspect contactors.

Maintenance



Maintenance

The charger requires little routine maintenance other than occasional cleaning to remove dust and debris from inside and around the unit. Disconnect power before opening the access panel. Only qualified maintenance personnel should open the cabinet to clean the inside of the charger.

Performance

There are several factors such as Line Voltage, Battery Temperature, Low Specific Gravity, and Battery Condition that have a substantial effect on the performance of battery charger. Check each condition on a regular basis to ensure optimum performance from your battery and charger.

Line Voltage

Should your line voltage be low or high, the output of the charger will drop or increase accordingly, affecting the performance of the battery charger.

Old Batteries

Discharged batteries should not be left for more than a day or two without recharging. If left discharged, a battery undergoes a chemical process known as sulphation. A common sign of sulphation is the side of a battery bulging. Once this happens, the battery may be permanently damaged and very difficult to recharge. Periodically recharge batteries even when they are not in use.

Poor Connections

Connections to the battery posts must be made with permanent connectors that provide a reliable, low-resistance connection. Alligator clips do not offer a suitable connection. Clean your battery terminals regularly.

Ambient Temperature

The capacity of a lead acid battery is sensitive to temperature. Refer to the battery manufacturer's temperature related specifications.

Battery Maintenance

Refer to the battery manufacturer's literature for specific maintenance recommendations. Lead acid batteries emit hydrogen and oxygen during recharging. As such, you must vent the battery compartment to prevent these gases from accumulating. Don't smoke or use an open flame when working around batteries.

Wear appropriate safety apparel, including eye protection, when handling or working around batteries.



Five Year Charger Limited Warranty



Vulcan Electric manufactures its hardware products from parts and components that are new in accordance with industry-standard practices. **Vulcan Electric warrants the charger to be free from defects in workmanship or materials for one year from the date of purchase. The rectifier is warranted for an additional two years, and the transformer is warranted for five years from the date of purchase.** During this period, Vulcan Electric will, at its options, repair or replace the defective product free of charge. This warranty will be considered VOID if the unit has suffered any physical damage or alteration, either internally or externally, and does not cover damage arising from improper use, or from use in an unsuitable environment. This warranty will not apply where the product has been misused, neglected, improperly installed, or repaired by anyone than Vulcan Electric or an Authorized Service Depot. In order to qualify for the warranty, the product must not be disassembled or modified without prior authorization by Vulcan Electric.

Repair or Replacement are your sole remedies and Vulcan Electric shall not be liable for damages, whether direct, incidental, special, or consequential, even though caused by negligence or fault.

Vulcan Electric owns all parts removed from repaired products. Vulcan Electric uses new parts made by various manufactures in performing warranty repairs and building replacement products. If Vulcan Electric repairs or replaces a product, its warranty term is not extended.

User is responsible for determining whether this Vulcan Electric product is fit for a particular purpose and suitable for user's method of application.

Vulcan Electric shall not otherwise be liable for loss or damages, whether direct, indirect, special, incidental, or consequential, regardless of the legal theory asserted, including, but not limited to, contract, negligence, warranty, or strict liability.

THIS IS VULCAN ELECTRIC'S ONLY WARRANTY, AND THE COMPANY MAKES NO WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

To Obtain Warranty Service:

If your Vulcan Electric Charger requires service, please return it to the place of purchase. If you are unable to contact your merchant, or the merchant is unable to provide service, contact:

Vulcan Electric
1512578 Ontario Ltd., 205B Konrad Cres., Markham, Ontario, L3R 8T9
Telephone: (905) 513-1550, Fax: (905) 513-1557
Website: www.chargers.ca

You must obtain a Return Authorized Number from Vulcan Electric before returning a Vulcan Electric Charger directly to Vulcan. Do not return a Vulcan Electric Charger without first obtaining a Return Authorization Number. When you contact Vulcan Electric to obtain service, be prepared to supply the Serial number of your Vulcan Electric Charger. The serial number is located on the front of the unit. The following information needs to be supplied:

- A description of the problem
- Serial number of the unit (serial number is located on the front of the unit) name and address of the dealer, where you purchased the unit, and date of purchase.
- Package the unit safely, preferably using the original box and packing materials, Include the Return Authorization Number, a return address where the repaired unit can be shipped, a contact name and telephone number, and brief description of the problem.

SHIP ALL UNITS PREPAID.