



ANALYTIC SYSTEMS

Power Conversion Solutions

INSTALLATION & OPERATION MANUAL

IBC320 Intelligent Battery Charger



An ISO9001 Registered Company Battery Chargers • Inverters • Power Supplies • Voltage Converters

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www.analyticsystems.com



ANALYTIC SYSTEMS
Power Conversion Solutions

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AC SOURCE BATTERY CHARGER

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS — This manual contains important safety and operating instructions for the battery charger.

BATTERY CHARGER PRECAUTIONS

1. Do not expose the battery charger to rain or snow unless it is a sealed model.
2. 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.
3. Do not disassemble the battery charger; return it to the manufacturer or an authorized service center when service or repair is required. Incorrect reassembly may result in a risk of electric shock or fire. Voltages in excess of 350 volts are present inside the charger anytime it is plugged into an AC outlet, even if it is switched off.
4. To reduce risk of electric shock, unplug the battery charger from the AC outlet before attempting any maintenance or cleaning. Turning off controls will not reduce this risk.
5. Never place battery charger directly above battery; gases from battery will corrode and damage battery charger.
6. Never allow battery acid to drip on the battery charger.

BATTERY SAFETY

1. **WARNING — RISK OF EXPLOSIVE GASES**
 - i. **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 EACH TIME BEFORE SERVICING EQUIPMENT IN THE VICINITY OF THE BATTERY, YOU READ THIS USER GUIDE AND FOLLOW THE INSTRUCTIONS EXACTLY.**
 - ii. To reduce risk of battery explosion, follow these instructions and those published by the battery manufacturer and manufacturer of any equipment you intend to use in vicinity of battery. Review the cautionary marking on these products.
2. **PERSONAL PRECAUTIONS**
 - i. Someone should be within range of your voice or close enough to come to your aid when you work near a battery.
 - ii. Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing, or eyes.
 - iii. Wear complete eye protection and clothing protection. Avoid touching eyes while working near battery.
 - iv. 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



- i. NEVER smoke or allow a spark or flame in the vicinity of a battery.
- ii. Be extra cautious to reduce risk of dropping a metal tool onto battery. It might spark or short-circuit the battery or another electrical part and cause a fire or explosion.
- iii. 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 melt metal, causing a severe burn.
- iv. NEVER charge a frozen battery.
- v. If it is necessary to remove a battery from service, always remove grounded terminal from battery first. Make sure all accessories connected to the battery are off, to prevent an arc when reconnecting the new battery.
- vi. Be sure the area around battery is well ventilated.
- vii. Clean the battery terminals regularly. Be careful to keep corrosion from coming in contact with eyes.
- viii. Study all the battery manufacturer's specific precautions such as removing or not removing cell caps while charging and recommended rates of charge.

GROUNDING AND AC POWER CORD CONNECTION INSTRUCTIONS

The plug must be plugged into an outlet that is properly installed and grounded in accordance with all local codes and ordinances.

DANGER Never alter the AC power cord or plug provided. If it will not fit the output, use an approved adapter or have the proper AC power cord installed by a qualified electrician. Improper connection can result in the risk of electric shock.

Medical Equipment Notice

Analytic Systems does not recommend the use of their products in life support applications where failure or malfunction of the product can be reasonably expected to cause failure of the life support device or to significantly affect its safety or effectiveness. Analytic Systems does not recommend the use of any of its products in direct patient care. Examples of devices considered to be life support devices are neonatal oxygen analyzers, nerve stimulators (whether used for anesthesia, pain relief, or other purposes), auto-transfusion devices, blood pumps, defibrillators, arrhythmia detectors and alarms, pacemakers, hemodialysis systems, peritoneal dialysis systems, neonatal ventilator incubators, ventilators for both adults and infants, anesthesia ventilators, and infusion pumps as well as any other devices designated as "critical" by the U.S. FDA.



Specifications

Input

Volts (VAC)	85 - 265, 1 Phase, 45 - 65 Hz
Current (max) *	4 Amps w. Inrush Protection
Input Fuse	AGC 5 Amp
Power Factor	> 0.99 at Full Load
Efficiency	> 90% at Full Load

*Maximum Input Current Specified at 85 VAC

Output

Nominal Voltage (VDC)	12	24	28	32	36	48
Voltage Range (VDC)**	12.0-15.5	24.0-31.0	28.0-36.2	32.0-41.3	36.0-46.5	48.0-62.0
Output Current (A)	20	10	8	7.5	7	5
Recommended Battery Amp-Hours	100	50	45	40	33	25
Std. Temperature Compensation	-15mV/C	-30mV/C	-35mV/C	-40mV/C	-45mV/C	-60mV/C
Number of Battery Banks	1 or 2					
Charging Stages	2 or 3 stage (user-selectable)					
End of Charge	Float or Rest (user-selectable)					

** Actual Output Voltage determined by User Settings or by Charger Firmware

Mechanical

Dimensions	9.5 in./24.1 cm Long x 8.0 in./20.3 cm Wide x 3.25 in./8.3 cm High
Clearance	2.0 in./5.0 cm all around
Weight	6.2 lb / 2.8 kg
Material and Finish	Marine Grade Black Anodized Aluminum with 18-8 Stainless Fasteners
Mounting	Wall or Shelf Mount
Connections	DC Output - Phoenix VDFK Terminal Block (Red and Black) AC Input - One 6-foot (2-meter) cable ending in a NEMA 5-15 plug

Environmental and Safety

Operating Temperature Range	-25°C+ to +40°C (-40°C to +55°C Optional)
Storage Temperature Range	-55°C to +85°C
Humidity	0 - 95% Relative Humidity (non-condensing)
Vibration	Built to meet MIL810g
Emissions	Complies with FCC Class B, Part 15
Isolation	> 1500 VDC Input-Output, Input-Case, Output-Case
Audible Noise	None (Ø db)
Duty Cycle	Continuous
Warranty	Five Years Parts and Labor
Safety	Built to meet ABS, CE, UL458 and CSA 22.2.107.1

* Specifications subjects to change without notice.



Introduction

The IBC320 *Intelligent series* Battery Charger delivers up to 300 watts of precision charging power to charge up to two 12, 24, 32, or 48 volt battery systems (the batteries must share a common ground).

This unit uses advanced Power Factor Correction circuitry on the AC input to use the electricity in the most effective and efficient way and will work from any standard AC voltage worldwide. Inside, LLC Resonant Converter technology allows Zero Voltage/Zero Current switching on the primary or high voltage side of the main power transformer, while active rectification on the secondary or low voltage side ensures maximum efficiency and minimum electromagnetic interference (EMI) for operation near sensitive radio frequency communication equipment.

The charger is pre-programmed with the charging profiles for three standard types of Lead Acid batteries; Flooded (traditional Lead Acid), AGM (Absorbed Glass Mat Lead Acid) and Gel or VRLA (Valve Regulated Lead Acid). A fourth profile pre-set for a typical Lithium Ion battery is also available. These profiles can be further customized by choosing 2 or 3 stage charging using the stage select switch on the front panel.

Any of the charging profiles can adjusted to suit any specific make and model of battery using the free-to-download PowerWizard software from www.analyticsystems.com. PowerWizard adds advanced algorithm reprogramming, charger monitoring and graphing function all accessible through the front panel USB port.

On the front panel, the charger comes standard eight dual color LEDs to clearly indicate charging levels and operating condition. Two sets of easy-to-use color coded battery connection terminals. Two battery temperature sensor ports are available for connection with the supplied battery temperature sensor (a second sensor can be added for monitoring two bank systems).

The charger uses the temperature data to compensate the output voltage for optimal charging as well as for monitoring purposes to prevent the battery from overheating during charging and equalize cycles. Other safety features include charger over temperature shutdown, current limiting, short circuit protection, input under voltage shutdown and output over voltage protection all with automatic recovery.

We are confident that this charger will provide you with many years of safe and reliable service.



Main Parts



Front Panel

- | | |
|--|---|
| <ol style="list-style-type: none">1. Battery Temperature Sensor Connection2. MicroUSB Communications Port3. Indicator LED Panel4. Lighted Power Button5. Program Push Button | <ol style="list-style-type: none">6. Stage Select Switch7. End-of-Charge Function Switch8. Select/Equalize Push Button9. DC Output Connection: Phoenix VDFK Terminal Block (Red and Black) |
|--|---|

Rear Panel

1. AC Input Connection: One 6 foot (2 meter) power cord ending in a NEMA 5-15 Plug

Package Contents

The box should contain:

- One IBC320 Intelligent Battery Charger
- One Battery Temperature Sensor (a second sensor is available from Analytic Systems or your dealer at additional cost, if required)
- One USB to Laptop cable
- This user guide (a .pdf copy can be downloaded from www.analyticsystems.com)
- One Warranty Registration Card
- The 'PowerWizard' software can be downloaded from www.analyticsystems.com

If anything is damaged or missing, please contact us by emailing sales@analyticsystems.com



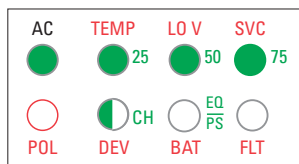
Operation

The IBC320 battery charger is designed for simple and intuitive operation. It is intended to operate fully unattended and will attempt to recover from any fault, including Charger Over-Temperature, Battery Over-Temperature, Low Input Voltage, AC Power Failure and more.

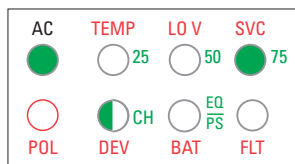
BATTERY CHARGER MODE

1. Connect the unit to the battery and AC power source.
2. Press the Power Button on the unit's front panel.
3. The charger will go through its startup sequence. All 6 microprocessor-controlled LEDs flash red and then green. When the Power Button starts glowing, the sequence is complete.
4. The charger will automatically begin charging the connected battery or batteries according to the settings selected during setup. See *Configuration Mode* for more information.

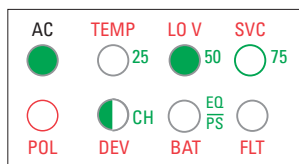
In Charger mode, the LEDs indicate the amount of current being supplied to the battery. This current drops as the battery's voltage rises.



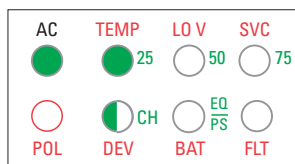
CHARGING CURRENT >85%



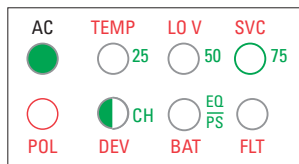
CHARGING CURRENT 60-84%



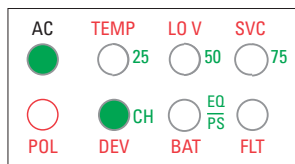
CHARGING CURRENT 40-59%



CHARGING CURRENT 11-39%



CHARGING CURRENT 1-10%



CHARGE COMPLETE



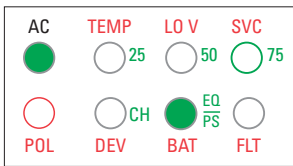
In addition to being a battery charger, the IBC320 is also capable of functioning as a power supply. While in Power Supply Mode, the unit's functionality is changed in the following ways:

- The DC outputs will be live regardless of whether or not a battery is detected.
- The End-of-Charge switch and Stage Select switch have no function.
- The Equalize push button has no function.
- The output voltage of the Power Supply is set to the Float Voltage. This value can be changed using PowerWizard. For more information, see the *PowerWizard manual*.

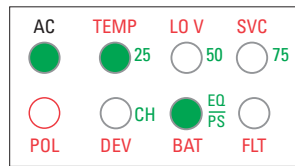
POWER SUPPLY MODE

1. Connect the unit to the load and AC power source.
2. Press the Power Button on the unit's front panel.
3. The charger will go through its startup sequence. All 6 microprocessor-controlled LEDs flash red and then green. When the Power Button starts glowing, the sequence is complete.
4. Press and hold the Power Button until you hear two beeps, to change the unit to Power Supply mode. The unit will remain in Power Supply mode until switched back to Charger mode, even if it is turned off.
5. To change the unit back to Battery Charger mode, press and hold the Power Button until you hear one beep.

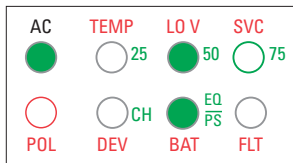
In Power Supply mode, the LEDs indicate the amount of current being drawn by the load(s).



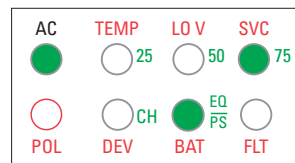
CURRENT < 10%



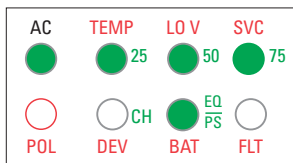
CURRENT >11 - 39%



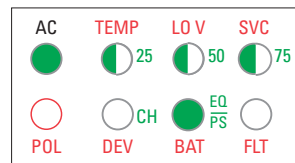
CURRENT > 40-59%



CURRENT > 60-84%



CURRENT > 85%



CURRENT = 100%



Installation

MOUNTING

When mounting your unit, take the following into consideration:

- The indicator LEDs and front panel controls should be easy to see and access.
- There are at least 2 inches of clearance all around the charger for air circulation and heat dissipation.
- The battery should be close to the charger to easy connection and to prevent trampling of the wiring.
- If there is possibility of water drippage, such as if the charger is in a marine environment, install the optional drip shield above the unit.

DC OUTPUT CONNECTION

This unit is equipped with 2 sets of VDFK Phoenix Terminal block connectors as DC Battery Output Connections. The recommended gauge of wire for this connection is 10AWG. That is the maximum gauge of wire that the battery connection terminals will accept and provides the best protection against vibration or breakdown of the wires over time.

The red terminal block connector connects to the positive terminal of the battery. The black terminal block connector connects to the negative terminal of the battery.

CAUTION: If you are charging two banks of batteries, they **MUST** share a common ground!

AC INPUT CONNECTION

This unit is equipped with a 6-foot (2-meter) power cord ending in a NEMA 5-15 plug as an AC Power Input Connection. This plug is suitable for connection with any standard North American wall outlet. Active Power Factor correction allows this unit to work from all conventional AC voltages.

BATTERY TEMPERATURE SENSOR CONNECTION

This unit is equipped with 2 RJ45 ‘telephone jack’ ports to serve as Battery Temperature Sensor connections. You may connect your sensor to either port. If you are using two sensors to measure two battery banks, the charger will use the temperature of the warmer battery for its calculations.

To install the sensor at the battery, you may:

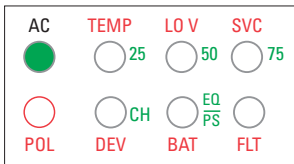
- Slide the sensor so it is flush between the battery and battery platform. Alternatively, the battery can also be placed on top of the sensor to hold it in place.
- Apply a little silicone RTV sealant to the sensor and stick it to the top of the battery.

If the temperature sensors are not used, the charger will use the default battery temperature programmed during setup. See *Default Battery Temperature* for more information.

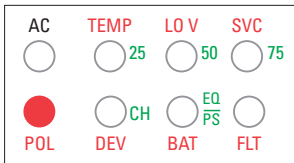


Connection

CONNECTION INDICATORS



AC PRESENT



BATTERY POLARITY REVERSED

1. Connect the charger to the batteries as indicated under *Installation*.
2. Check the POL LED on the front panel. If it is glowing red, the battery is connected in reverse polarity. Correct the connection to the battery (The red terminal should go to Positive and black to Negative).
3. Once the POL LED is off, connect the charger to the AC power source. The AC LED should start glowing green. This indicates that the charger is receiving power from the AC source and that its internal power supply is working.

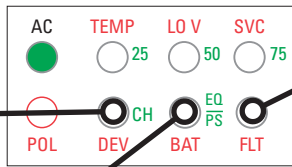
Configuration Mode

After turning the charger on, it will immediately begin charging any connected batteries with its pre-programmed parameters. These parameters can be accessed and changed through Configuration mode.

TO ACCESS CONFIGURATION MODE:

1. Press and hold the Program (PRG) button for three seconds until you hear a beep and the DEV LED starts blinking. This indicates that the unit is in Configuration mode.
2. Press the Program (PRG) button to cycle through the parameters you can program. The parameter which you programming can be determined by which bottom row LED is blinking.

If the DEV LED is blinking, you are programming the Battery Type parameters.



If the BAT LED is blinking, you are programming the Current Limit parameters.

If the FLT LED is blinking, you are programming the Default Battery Temperature parameters.

3. Press the Select (SEL) button to cycle through the settings for each parameter. The setting can be determined by the combination of top row LEDs glowing.



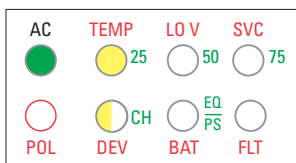
Battery Type

The Battery Type parameters controls the type of charging profile that the unit will use to charge the battery. Different types of batteries have different optimal charging voltages and currents due to their physical and chemical construction. This unit is pre-programmed with four common battery types.

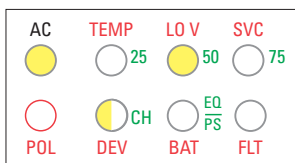
- Flooded Lead-Acid
- Absorbed Glass Mat (AGM)
- Gel Lead-Acid
- Lithium Ion (Li-ion)

You can create your own custom charging profile using PowerWizard. For more information, see the *PowerWizard manual*.

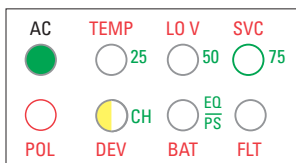
BATTERY TYPE INDICATORS



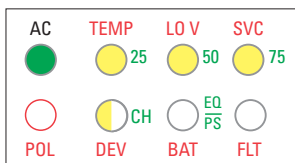
FLOODED LEAD ACID (DEFAULT)



ABSORBED GLASS MAT



GEL LEAD-ACID



LITHIUM-ION



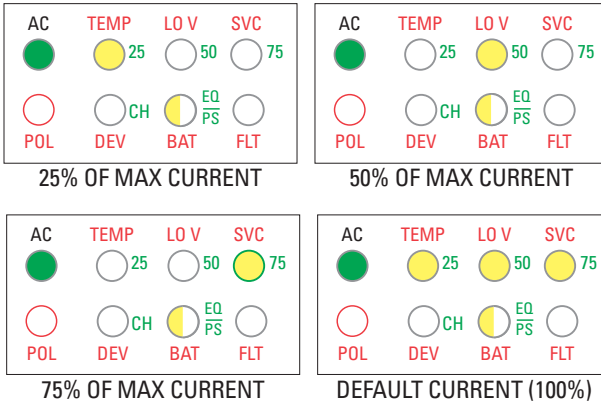
Current Limit

The Current Limit parameters controls the unit's maximum charging current. Depending on the size and type of your batteries, this unit's standard maximum current may be more than what is optimal or recommended. Refer to your battery manufacturer's documentation to determine its maximum safe charging current.

If needed, the unit's maximum charging current can be reduced to 25, 50 or 75 percent of the standard maximum rating.



CURRENT LIMIT INDICATORS

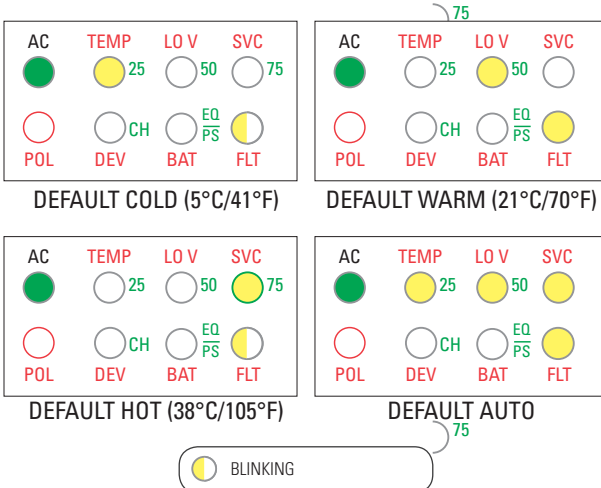


Default Battery Temperature

The Default Battery Temperature parameters controls the charger’s estimated value of the battery temperature. The optimal charging voltage of a battery will decrease as its temperature increases. The charger uses this value to calculate its charging compensation if there are no battery temperature sensors installed and it cannot obtain real-time data.

The three settings are 5°C, 21°C and 38°C and Auto. In Auto, the charger measures its own internal temperature during startup and estimates the batteries to be the same. If the charger detects the battery temperature sensor(s) is/are installed, their readings will take precedence.

DEFAULT BATTERY TEMPERATURE INDICATORS





Saving and Exiting

To save your settings and exit Configuration mode at any point, press and hold the Program (PRG) button until you hear a one second beep.

To exit without saving, simply press then Power Button to turn the unit off.

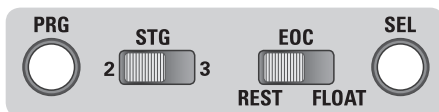
NOTE: If 60 seconds passes and no button is pressed, the charger will automatically exit Configuration mode without saving any settings.

Full Reset

To restore the charger to its factory settings, press and hold both the Program (PRG) and Select (SEL) buttons for 10 seconds until you hear multiple beeps.

Front Panel Adjustments

Two additional adjustments can be made from the front panel. Using the switches between the Program and Select buttons, you can select the type of charging cycle used and control the End of Charging behavior of the unit.



End-of-Charge Select

The End-of-Charge (EOC) select switch controls the charger's behavior after it finishes charging the battery/ batteries.

Setting the switch to Rest:

- Causes the unit to remain in rest mode after finishing the recharge cycle. The charger will remain like this until it detects that the battery voltage has dropped <90% of the rated voltage. It will then initiate a new recharge cycle.
- The charger will also initiate a new recharge cycle if power to the unit is disconnected or cycled.
- This EOC Select Switch **MUST** be in the Rest position for the unit to meet the California Energy Commission regulations.

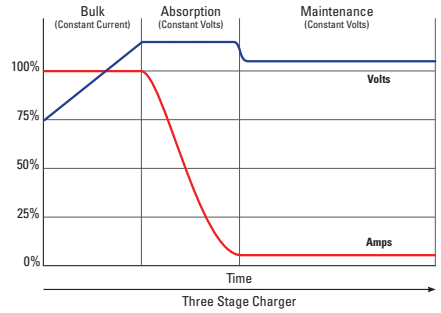
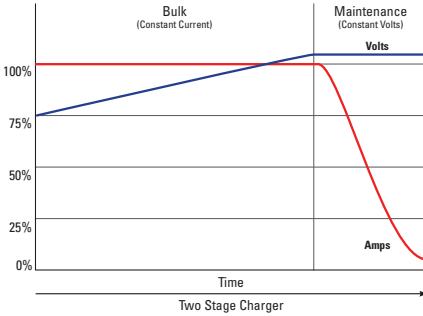
Setting the switch to Float:

- Causes the unit to maintain the battery at the float voltage indefinitely. This will ensure that the battery is always fully recharged and ready for use.
- A new recharge cycle will only be initiated if the charger is proving its full rated current to keep the battery at float, or if the power is disconnected or cycled.



Stage Select

The Stage (STG) select switch controls whether the unit uses a two-stage or three-stage charging cycle. Generally, two-stage charging is preferred for loaded batteries and three-stage for idle or unloaded batteries. The two settings are detailed below.



TWO-STAGE CHARGING

A two-stage charging cycle occurs in two stages.

During the bulk stage, the battery is charged at a constant current until reaching the float voltage. Then during the float stage, the battery is held at the float voltage while the current reduces as necessary to maintain this. The charging is considered complete when the charging current drops to 10% of its rated output.

Two-stage charging is gentler on the battery than three-stage. The battery is subjected to lower voltages than in three-stage charging and in addition, a reasonable load can be put on the battery without altering its ability to keep the battery at full charge.

THREE-STAGE CHARGING

A three-stage charging cycle occurs in three stages.

During the bulk stage, the battery is charged at a constant current until reaching the absorption voltage. Then during the absorption stage, the battery is held at that voltage while the current reduces as necessary to maintain it. Finally during the Float stage, the battery voltage is lowered to the float voltage. The charging is considered complete when the charging current drops to 10% of its rated output.

Three-stage charging is faster than two-stage charging. However, the charger cannot differentiate between a current going to a load on the battery, and a current being absorbed by the battery, so it can overcharge a battery that is powering a load.



Equalize Cycle

If a battery's cells are left discharged for too long, sulfate crystals can form on the plates interfering with their conductance. This reduces the battery's capacity and recharging ability.

An equalize cycle is a deliberate overcharge of the battery at high voltage (110% of float voltage) and low current (10% of standard output) to force undercharged cells to match charge of the good cells in the battery.

An equalize cycle should only be performed once every six months as it is hard on the good cells of the battery and can cause water loss in non-sealed batteries.

DANGER: An equalize cycle can only be performed in a well ventilated area.

Hydrogen gas is a normal by-product of the cycle and is explosive at concentrations greater than 4%.

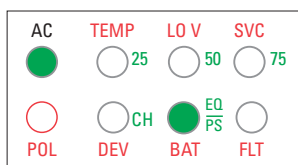
CAUTION: A battery temperature sensor must be used.

A battery temperature sensor must be connected and installed at the battery. Careful temperature monitoring is required during the equalize cycle. Failure to do so can result in severe damage to the battery!

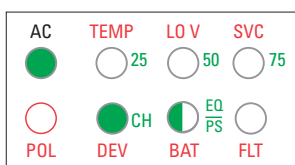
TO PERFORM AN EQUALIZE CYCLE

1. Connect the battery temperature sensor to the unit and install the sensor at the battery as indicated in *Installation*.
2. The charger must be in battery charger mode and not power supply mode.
3. Push the Equalize button on the front panel. The button is recessed to prevent accidental operation; a ballpoint pen can be used to access it.
4. The EQUALIZE LED will glow green indicating the beginning of the equalize cycle. If the battery charger is currently charging a battery, the EQUALIZE LED will blink green. Once the charging cycle is complete, the EQUALIZE LED will glow green
5. Three hours later, the Equalize cycle will end and the EQUALIZE LED will turn off. The cycle will also end if the charger detects that the battery temperature has reached 40°C or higher.
6. Afterwards, the charger will maintain that battery at either standby or rest depending on the position of the End-of-Charge switch.

EQUALIZATION INDICATORS



EQUALIZING



EQUALIZE PENDING



Maintenance

This charger requires no maintenance other than the occasional wipe down to remove dust that could reduce its ability to dissipate heat. Carefully blow air through the cooling vent to remove any dust buildup inside the unit.

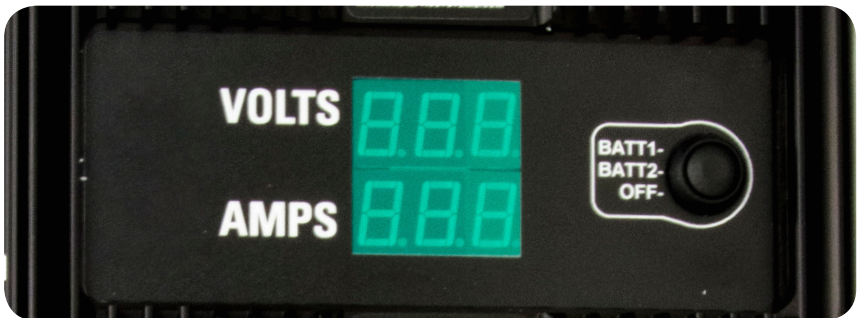
Dry Contact Relay

The charger can be fitted with a 1 amp dry contact relay to indicate charger status to a monitoring system. It has both a normally-open and normally-closed contact which changes state depending on the presence or absence of charging voltage on the output and is independent of the microprocessor.

If the charger is producing voltage on the output, the normally closed contact will be closed and there will be an electrical connection between NC and COM. If the voltage on the output of the charger goes to zero, the contact will change state. The Normally Open contact operates exactly in the reverse of the Normally Closed contact.

Digital Meter - Option V

The IBC320 can be equipped (by factory order) with a bright chassis-integrated digital meter to display the battery voltage and charging current being supplied to up to both connected batteries. This digital meter option adds 2.5-3 inches to the length of the chassis.



There are three possible displays that can be cycled through using the push button on the digital meter.

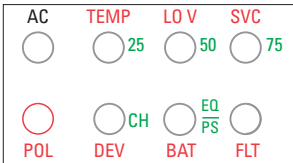
- **Battery 1:** Battery Voltage and Charging Current
- **Battery 2:** Battery Voltage and Charging Current
- Display OFF



Troubleshooting

The IBC320 is designed to provide years of reliable service and to auto-recover in the event of an operational failure. In the event of malfunction, the unit is fitted with eight LED indicators and an audible alarm to help diagnose the cause of the issue. Below is a list of potential issues, and how to repair them.

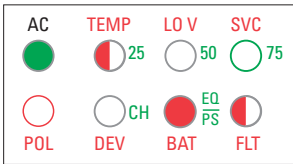
FAULT INDICATORS



No AC Power Detected

First, make sure any external circuit breaker is ON. Unplug the unit from the AC power. Using a multimeter, make sure AC power is present in the receptacle. Check that the input fuse hasn't blown. If the fuse is open, replace it with the recommended fuse listed on the label and reconnect to AC power. If the AC LED still does not glow, then there is likely an internal failure and the charger will have to be returned for service.

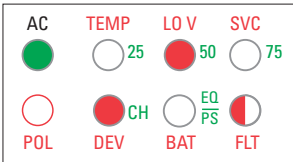
NO AC POWER DETECTED



Battery Over Temperature Indication

The charger has detected that the battery is too hot to safely charge (>43°C/110°F) and shut off. The charger will automatically reconnect when the battery cools to a safe temperature (<32°C/90°F). If this happens frequently, particularly in relatively normal ambient temperatures, the battery is likely damaged or defective and should be replaced.

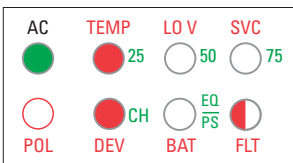
BATTERY OVERTEMP



Low Input Voltage Indication

The charger has detected that the input voltage has dropped below the minimum level needed for normal operation. The charger will shut off and wait for the voltage to recover.

CHARGER LO VOLTAGE



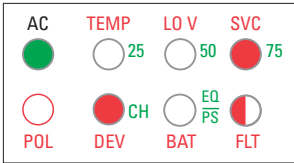
Charger Over Temperature Indication

The charger has detected that its internal temperature is above safe operating limits. The charger will shut off until the temperature has returned to normal limits. If this happens frequently, the charger may need to be remounted for better air circulation.

CHARGER OVERTEMP



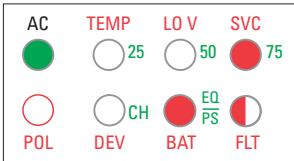
FAULT INDICATORS



CHARGER FAILED

Charger Failure Indication

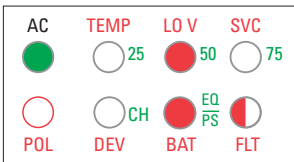
The microprocessor has detected a condition that prevents the charger from operating. Try disconnecting the AC power and re-connecting it. If this does not clear the fault, the cause is likely an internal component failure and the charger will have to be returned for service



BATTERY FAILED

Battery Fail Indication

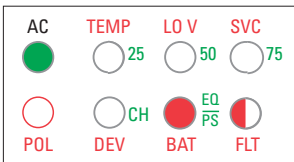
The charger has detected the connected battery is defective and will not accept a charge, the charger will stop attempting to charge the battery. Replace the battery and cycle power to the unit using the Power Button to reset this condition.



BATTERY LO VOLTAGE

Battery Low Voltage Indication

If the battery is seriously discharged, and the charger voltage drops below 85% of nominal (ie. 10V for a 12V charger), the charger will show this display until the battery voltage exceeds 85% of nominal.



NO BATTERY

No Battery Detected

The charger has detected that no battery is connected. Connect a battery to the unit to clear this fault.

If a battery IS connected and you see this fault, this usually means the battery is completely discharged. Try switching the unit to Power Supply mode for a few minutes and then back to Charger mode to see if it will return the battery to life. If it doesn't, the battery is defective and will have to be replaced.



Abbreviations and Definitions

We use a number of abbreviations on the labels to save space. Here are the full words corresponding to each abbreviation along with common battery charger terms and their definitions:

ABBREVIATIONS

POL – Polarity. Refers to the correct connection of the Positive and Negative terminals of the battery to the charger.

DEV – Device. Refers to the charger. Used together with the Fault LED to indicate a problem with the Device.

BAT – Battery. Refers to the battery. Used together with the Fault LED to indicate a problem with the Battery.

FLT – Fault. Used to indicate a problem with the battery (BAT) or the device (DEV) **AC** – Alternating Current

TEMP – Temperature. Used to indicate that either the Battery or the Device is too hot.

LO V – Low Voltage. Used to indicate that either the Input Voltage or the Battery Voltage is too low.

FAIL – Used to indicate that either the battery or the device needs repair or replacement.

PRG – Program - Button used to initiate the Programming Mode

STG – Stage – Switch used to select between 2-Stage or 3-Stage charging profile

EOC – End Of Charge – Switch used to select Rest or Float at the end of a charge cycle

SEL – Select – Button used to make choices during front panel programming **CH** – Charging

EQ – Equalize

PS – Power Supply



DEFINITIONS

- CC – Constant Current. Typically the first phase of a recharge cycle where a constant current is delivered to the battery until the voltage reaches a specific level.
- CV – Constant Voltage. Typically the 2nd or 3rd phases of a recharge cycle where the battery voltage is maintained at a constant level.
- Absorption – The first Constant Voltage stage in a 3 stage charging algorithm, where the battery is maintained at an elevated voltage for a period of time to ensure full and equal recharging of all cells.
- Equalize – A deliberate overcharge at low current to bring a weak cell up to the same charge level as the good cells in a weak battery. Typically only performed once every few months, and only if battery exhibits reduced capacity.
- Float – The second and final Constant Voltage stage in a 3 stage charging algorithm, or the only Constant Voltage stage in a 2 stage algorithm where the battery is held at safe voltage indefinitely.
- Amp-Hour Capacity – The energy capacity of a battery expressed in the number of hours the battery can last a specific output current. For example, 100 Amp-Hours means that a battery can supply 100 amps for 1 hour, or 10 amps for 10 hours, etc.
- C/20 Rate – The number of amps that a battery can supply for 20 hours. For example a 100 amp hour battery should be able to supply 5 amps continuously for 20 hours. Battery capacity varies with the discharge rate. The higher the discharge rate, the lower the capacity of the battery.
- Deep Discharge Battery – a battery designed to have a lower maximum current capability, but can be repeatedly deeply discharged without damaging it or seriously affecting its lifespan.
- Engine Starting Battery – a battery designed to produce a very high amperage for engine starting, but typically does not tolerate repeated deep discharging.





Limited Warranty

1. The equipment manufactured by Analytic Systems Ware (1993) Ltd. (the “Warrantor”) is warranted to be free from defects in workmanship and materials under normal use and service.
2. This warranty is in effect for:
 - a. 3 Years from date of purchase by the end user for standard products offered in our catalog.
 - b. 2 Years from date of manufacture for non-standard or OEM products
 - c. 1 Year from date of manufacture for encapsulated products.
3. Analytic Systems will determine eligibility for warranty from the date of purchase shown on the warranty card when returned within 30 days, or
 - a. The date of shipment by Analytic Systems, or
 - b. The date of manufacture coded in the serial number, or
 - c. From a copy of the original purchase receipt showing the date of purchase by the user.
4. In case any part of the equipment proves to be defective, the Purchaser should do the following:
 - a. Prepare a written statement of the nature of the defect to the best of the Purchasers knowledge, and include the date of purchase, the place of purchase, and the Purchasers name, address and telephone number.
 - b. Call Analytic Systems at 800-668-3884 or 604-946-9981 and request a return material authorization number (RMA).
 - c. Return the defective part or unit along with the statement at the Purchasers expense to the Warrantor; Analytic Systems Ware (1993) Ltd., 8128 River Way, Delta, B.C., V4G 1K5, Canada.
5. If upon the Warrantor’s examination the defect proves to be the result of defective material or workmanship, the equipment will be repaired or replaced at the Warrantor’s option without charge, and returned to the Purchaser at the Warrantor’s expense by the most economical means. Requests for a different method of return or special handling will incur additional charges and are the responsibility of the Purchaser.
6. Analytic Systems reserves the right to void the warranty if:
 - a. Labels, identification marks or serial numbers are removed or altered in any way.
 - b. Our invoice is unpaid.
 - c. The defect is the result of misuse, neglect, improper installation, environmental conditions, non-authorized repair, alteration or accident.
7. No refund of the purchase price will be granted to the Purchaser, unless the Warrantor is unable to remedy the defect after having a reasonable number of opportunities to do so.
8. Only the Warrantor shall perform warranty service. Any attempt to remedy the defect by anyone else shall render this warranty void.
9. There shall be no warranty for defects or damages caused by faulty installation or hook-up, abuse or misuse of the equipment including exposure to excessive heat, salt or fresh water spray, or water immersion except for equipment specifically stated to be waterproof.
10. No other express warranty is hereby given and there are no warranties that extend beyond those described herein. This warranty is expressly in lieu of any other expressed or implied warranties, including any implied warranty of merchantability, fitness for the ordinary purposes for which such goods are used, or fitness for a particular purpose, or any other obligations on the part of the Warrantor or its employees and representatives.
11. There shall be no responsibility or liability whatsoever on the part of the Warrantor or its employees and representatives for injury to any person or persons, or damage to property, or loss of income or profit, or any other consequential or resulting damage which may be claimed to have been incurred through the use or sale of the equipment, including any possible failure of malfunction of the equipment, or part thereof.
12. The Warrantor assumes no liability for incidental or consequential damages of any kind




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ANALYTIC SYSTEMS
Power Conversion Solutions

Battery Chargers • Inverters • Power Supplies • Voltage Converters

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