

# Installation & Operation Manual

Battery Chargers for NFPA-20 Centrifugal Fire Pump

Metron, Inc.    Date: 8/22/03  
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Approved: MH

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# IMPORTANT SAFETY INSTRUCTIONS FOR INSTALLER AND OPERATOR

1. SAVE THESE INSTRUCTIONS.
2. Use of an attachment not recommended or sold by Metron may result in a risk of fire, electric shock, or injury to persons.
3. ONLY TRAINED AND QUALIFIED PERSONNEL MAY INSTALL AND SERVICE THIS UNIT.
4. Do not operate charger if it has received a sharp blow, been dropped, or otherwise damaged in any way; shut off power at the branch circuit protectors and have the unit serviced or replaced by qualified personnel.

## **WARNING:**

### **RISK OF EXPLOSIVE GASES.**

- A. WORKING IN THE VICINITY OF A STORAGE BATTERY IS DANGEROUS. STORAGE BATTERIES GENERATE EXPLOSIVE GASES DURING NORMAL BATTERY OPERATION. FOR THIS REASON, IT IS OF UTMOST IMPORTANCE THAT EACH TIME BEFORE USING YOUR CHARGER, YOU READ THIS MANUAL AND FOLLOW THE INSTRUCTIONS EXACTLY.
- B. To reduce the risk battery explosion, follow these instructions and those published by the battery manufacturer and the manufacturer of any equipment you intend to use in the vicinity of a battery. Review cautionary markings on these products and on the engine.
- C. **NOTE: It is critical that all leads from the battery charger to the battery terminals be tight and free of corrosion. Loose terminals or corroded terminals will result in a battery charger fault or unreliable charger operation. To ensure recharge time in 24 hours, wire length should be as short as possible. In the case of wire lengths from the controller to the batteries and back are in excess of 25 ft, larger wire than 10AWG may be required.**

## 5. PERSONAL PRECAUTIONS

- A. Someone should be within range of your voice or close enough to come to your aid when you work near a storage battery.
- B. Have plenty of fresh water and soap nearby in case battery electrolyte contacts skin, clothing, or eyes.
- C. Wear complete eye protection and clothing protection. Avoid touching eyes while working near a storage battery.
- D. If battery electrolyte contacts skin or clothing, wash immediately with soap and water, If electrolyte enters eye, immediately flood the 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. Using insulated tools reduces this risk, but will not eliminate it.
- G. Remove personal metal items such as rings, bracelets, necklaces, and watches when working with a storage battery. A storage battery can produce a short circuit current high enough to weld a ring or the like to metal, causing a severe burn.
- H. Use this charger for charging LIQUID ELECTROLYTE LEAD-ACID batteries only. Do not use this battery charger for charging dry cells, alkaline, lithium, nickel-metal-hydride, or nickel cadmium batteries. These batteries may burst and cause injuries to persons and damage to property.
- I. NEVER charge a frozen battery.

## INSTALLATION INSTRUCTIONS

- A. Be sure battery terminals are clean and properly tightened. Be careful to keep corrosion from coming in contact with eyes.
- B. Add distilled water to each cell until the electrolyte reaches the level specified by the battery manufacturer. This helps purge excess gas from the cells. Do not over fill. Due to increased water consumption at high charge rates, these chargers may be used with refillable batteries only.
- C. Study all battery manufacturer's specific precautions such as removing or not removing cell caps while charging and recommended rates of charge. The recommended charge current range must include the rated output current of this charger, which is 10 amperes. Set the float voltage jumper to the battery manufacturer's recommended float charge voltage. Incorrect charge voltage will accelerate generation of explosive gases, increasing the risk of fire or explosion.
- D. Set the automatic boost charge mode (equalizing charge) to the HIGH rate setting. This is the only setting that will meet the NFPA-20 recharge time requirements.
- E. Determine the voltage of the battery by referring to the engine or battery owner's manual and make sure that the 12V/ 24V select jumper is set to the correct voltage.

## WIRE RATINGS

- A. AC and DC power conductors should be rated for use at 90° C or higher. Alarm and temperature sensor ad conductors may use Class 2 wiring.
- B. All conductor sizes should be coordinated with the fault protection devices: 10Amp on AC input (14 AWG or larger), 30A on DC output (10 AWG to batteries or larger), 2A on Alarm terminal block (20 AWG or larger).
- C. Wire sizes are minimums. Refer to local electrical codes for additional requirements.

## STATIC DISCHARGE PRECAUTIONS

- A. The printed circuit board contains static sensitive components. Damage can occur even when static levels are too low to produce a noticeable discharge shock. To avoid static discharge damage:
- B. Handle the charger by the chassis only. Remove the cover only when access is essential for installation and service, and replace it promptly when finished.
- C. If possible, wear an approved static protection strap. If one is not available, touch one hand to the chassis before contacting any other part of the charger.

## ALARM CONTACT CONNECTIONS

**CONNECT ALARM TERMINALS ONLY TO LOW VOLTAGE, LIMITED ENERGY ("CLASS 2") CIRCUITS. ALARM CIRCUITS ARE RATED 30V, 2A MAXIMUM.**

RELAY CONTACTS	MASTER ALARM
COMMON	TB5-4
OPEN ON ALARM	TB5-5
CLOSE ON ALARM	TB5-6

#### TB 4. TEMPERATURE SENSOR CONNECTIONS.

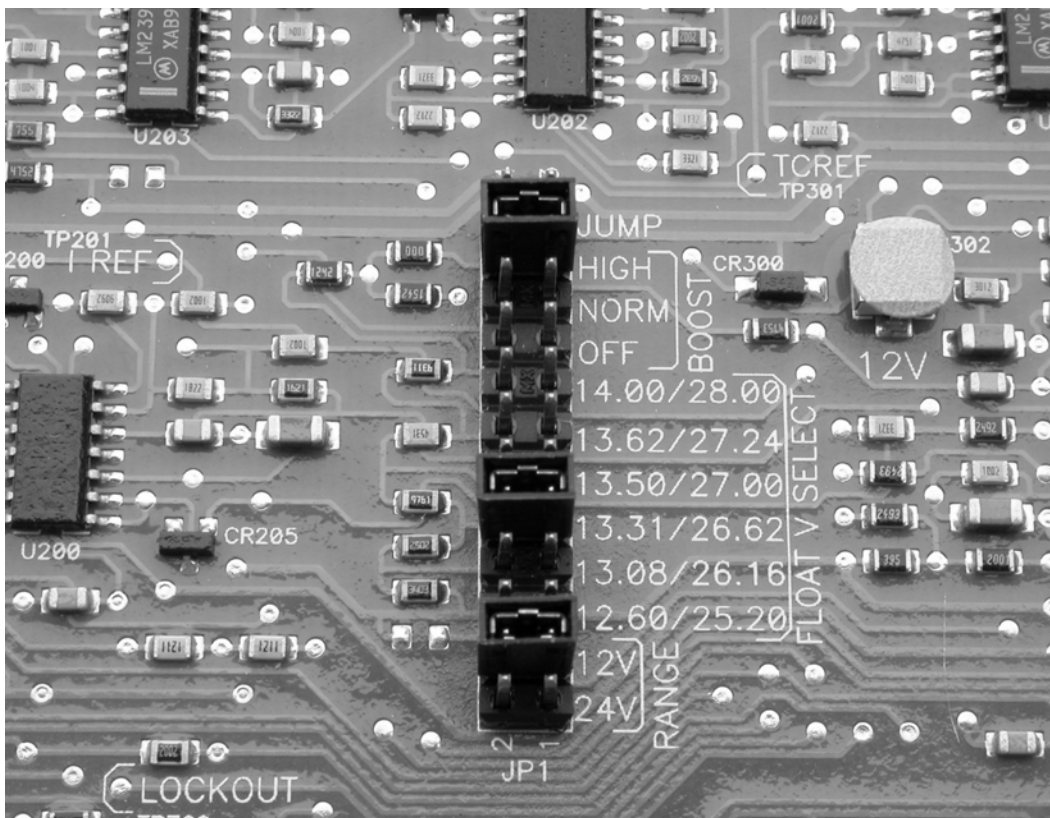
- A. Battery temperature increases at the high charging rate required to meet NFPA-20 recharge time requirements. If extreme temperatures exist or if the battery charger is located in an area where the temperature is considerably different from that of the batteries, attach the temperature sensor to a surface that accurately tracks the battery temperature, such as to the positive battery terminal, or against the outside of the battery case.
- B. This unit is shipped with a temperature sensor attached to terminal block TB4.
- C. The sensor is not polarized, so it does not matter which lead connects to terminal #1. The temperature sensor leads are low voltage, limited energy (“Class 2”) circuits. Route the wires through the plastic bushing below TB5, keeping the conductors at least ¼ inch (6 mm) away from DC wiring, AC wiring, and the circuit board. The terminals will accept 20 through 16 AWG conductors. Verify that all connections are secure and in the proper locations. Tighten all unused screws on the terminal blocks to secure them against vibration.

#### INTERNAL ADJUSTMENTS

##### WARNING

**MAKE SURE THE AC POWER TO THE CHARGER IS SHUT OFF WHILE MAKING THE FOLLOWING ADJUSTMENTS.**

- A. Set the AC voltage select switch (SW 100) according to the line voltage. Use the 115V position for nominal mains voltages between 110V and 120V only.
- B. Set the battery range jumper (JP1A) according to nominal battery voltage. Use the 12V position for 12V batteries. Use the 24V position for 24V batteries



- C. For NFPA-20 fire pump applications, set the boost mode jumper (JP1B) to the HIGH setting.

**WARNING:**

**THE HIGH BOOST SETTING IS FOR USE ONLY IN NFPA-20 FIRE PUMP INSTALLATIONS. THIS SETTING INCREASES BATTERY WATER CONSUMPTION. REGULAR MAINTENANCE OF BATTERY ELECTROLYTE LEVELS IS ESSENTIAL. THIS SETTING IS COMPATIBLE ONLY WITH VENTED LEAD-ACID BATTERIES**

**OF 6 OR 12 CELLS, 1.255-1.290 SPECIFIC GRAVITY, AND UP TO 220 AMPERE-HOUR CAPACITY. DO NOT USE THIS SETTING WITH NICKEL-CADMIUM, VALVE-REGULATED LEAD ACID, OR ANY TYPE OF “MAINTENANCE-FREE” BATTERY.**

- A. Set the float voltage select jumper (JP1C) according to the battery manufacturer’s recommended 25°C float voltage. The settings are:
  - 13.62/27.24 for 6 or 12 cell lead-acid at 2.27V/cell
  - 13.50/27.00 for 6 or 12 cell lead-acid at 2.25 V/cell
  - 13.3 1/26.62 for 6 or 12 cell lead-acid at 2.22V/cell
  - 13.08/26.16 for 6 or 12 cell lead-acid at 2.18V/cell
  - 14.00/28.00 and 12.60/25.20 are for nickel cadmium batteries only.
- B. For fully enclosed models, replace the cover by sliding it straight onto the charger. Ensure the cover’s locating tabs engage the slots in the chassis. Secure the cover with its four mounting screws. Open frame models are to be installed inside another product’s electrical and fire protection enclosure.
- C. The JUMP position allows initial charging of new lead acid batteries supplied from the manufacturer dry and discharged, from a zero charge state. To use this feature, temporarily move JP 1 C from the HIGH BOOST setting to the JUMP position. Operate the charger for a short time, just long enough to retain more than 1.5V per cell. Then disconnect AC power, and place JP1C back to the HIGH boost setting.

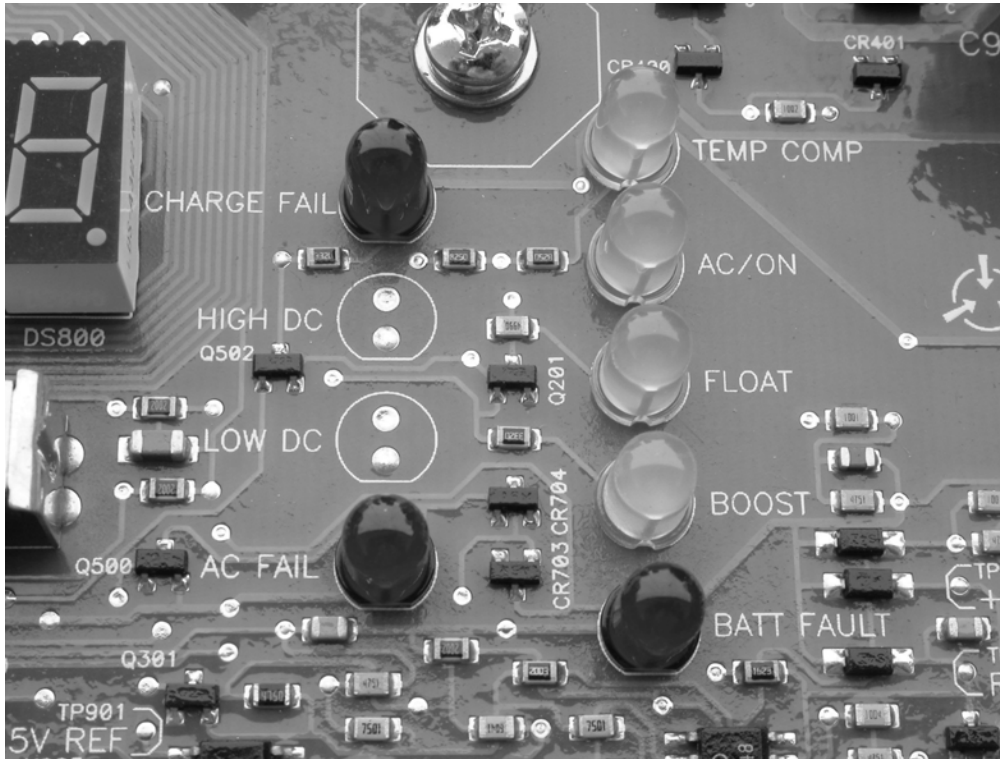
**WARNING:**

**USE THE JUMP FEATURE ONLY WITH RECENTLY FILLED NEW LEAD ACID BATTERIES SUPPLIED FROM THE MANUFACTURER DRY AND DISCHARGED. FOR EXCESSIVELY DISCHARGED LEAD ACID BATTERIES THAT HAVE ALREADY BEEN IN SERVICE. CONSULT THE BATTERY MANUFACTURER TO DETERMINE IF AND HOW THEY CAN BE SAFELY RESTORED TO SERVICE.**

**WARNING:**

**NEVER LEAVE A JUMPER IN THE JUMP POSITION DURING NORMAL OPERATION. THIS DISABLES THE BATTERY VOLTAGE INTERLOCK, WHICH INCREASES THE RISK OF ACCIDENTALLY OVERCHARGING 12V BATTERIES WITH THE 24V SETTINGS.**

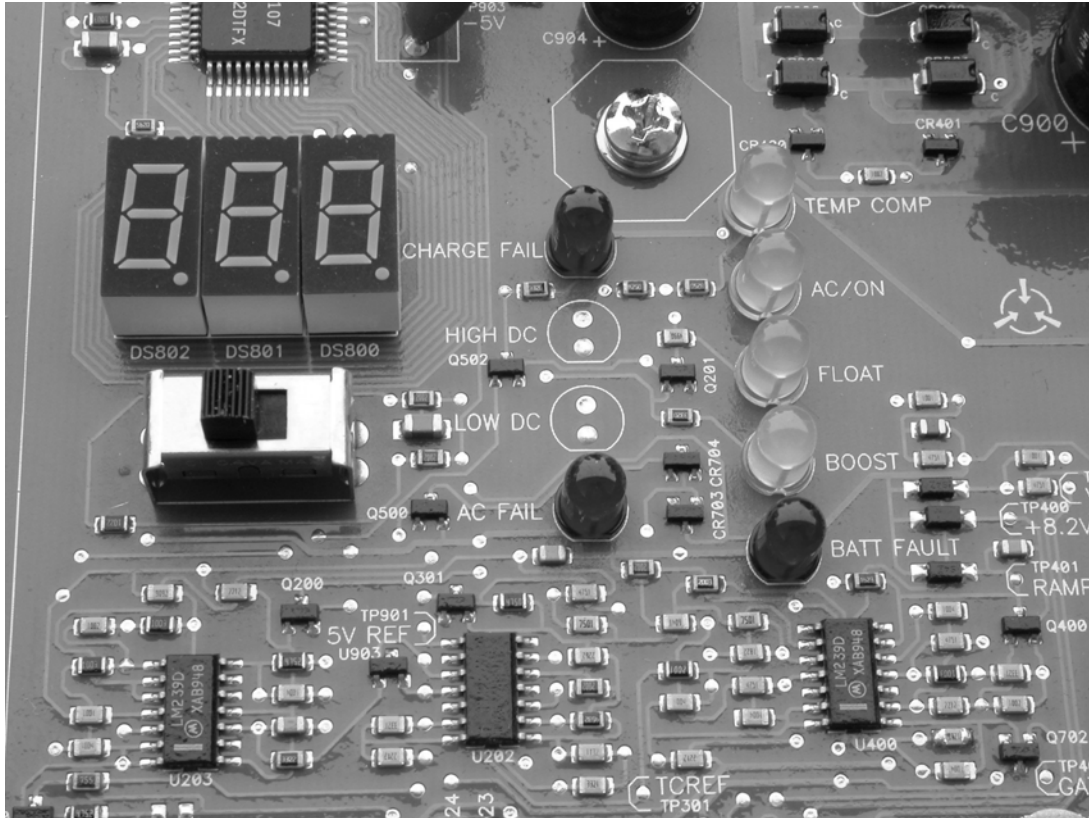
## CHECKOUT



See OPERATOR INSTRUCTION section for LED indicator definitions:

Verify the status LEDs:

- A. AC FAIL should be ON. If not, the DC output maybe open or reversed, or the battery may be extremely discharged.
- B. BATT FAULT should be OFF. If it lights, check for reversed polarity of the DC wiring. All other LEDs and the meter display should be



off.

- C. Select the voltmeter function by sliding the meter switch to the “V” position.
- D. Apply AC power by closing the branch circuit breaker and any other disconnect devices. The meter display should light immediately after power on and display the battery voltage. The green AC/ON LED should light after a few seconds. The green T-COMP (Temperature Compensation) LED must be lighted, showing that the temperature compensator is operational.
- E. If the BATT FAULT LED lights when AC is applied, this indicates that the battery voltage does not agree with the Range jumper setting. The charger is interlocked, and will not operate in this condition. Disconnect AC power, then correct the jumper setting or battery voltage before proceeding.
- F. After a short delay (typically 10 seconds or less), the charger will produce output. The voltmeter reading should increase, indicating the battery is being charged.
- G. Change the meter switch to the “A” position to read output current. Current should be close to 10A if the battery requires recharging. When the BOOST MODE LED is lighted, the battery will be charged until it reaches the fast charge voltage (15.2/23.4V). When the battery is fully charged, the green FLOAT MODE LED will light and the charger output drops to the charge maintenance (float voltage) setting. Output current will be low if the battery is fully charged, possibly too low to read on the meter. This is normal, provided the correct charging voltage is present. The green FLOAT MODE LED should light when output current is below approximately 5 A.

## OPERATOR INSTRUCTIONS

### WARNING:

USE THIS CHARGER FOR CHARGING LIQUID-ELECTROLYTE LEAD-ACID BATTERIES ONLY.  
THIS CHARGER IS FOR USE ONLY IN NFPA-20 CENTRIFUGAL FIRE PUMP APPLICATIONS

#### A. ADVANCED DESIGN FEATURES

**Fault Tolerant** : The charger is protected from the following faults:

- Reverse battery connection.
- \* Powering up into a shorted battery.
- Powering up with the wrong voltage setting (24V charger with 12V battery)
- Powering up into an open battery (Battery not connected)
- Internal power component failures.
- Over heating (over temperature output power reduction).
- Protected against power line transients and surges

#### **Battery Friendly**

- Float and boost voltage selectable at install per specific battery vendor recommendations
- Remote temperature compensation for most accurate float and boost voltage control.
- Able to charge a dead battery.
- Float and Boost voltage electronically controlled Robust Hardened Construction
- Shock and Vibration tested to UL 991, 2G
- Shock and Vibration tested to UL 991, SG option available
- Wide operating temperature range 20 to + 40 Degrees C Charger will operate at reduced output current rating up to +60 Degrees C
- Conformal coated printed wiring boards for erosion protection.

#### **Worldwide Agency Approvals**

- UL listed, UL 1012, UL 1236, and UL1236 supplement SB (for centrifugal fire pump and emergency power system service)
- 50 and 60Hz models are CE marked for EMC directive (industrial environment) and EN 60335-2-29



B.LED INDICATOR DEFINITIONS AND TROUBLE SHOOTING:

	TEXT	LED		Trouble Shooting
1	CHGR FAIL	RED	Charger Failure	Charger unable to provide charging current to battery or run-away charger output. Replace unit.
2	AC FAIL	RED	Input AC Missing	Check AC input voltage to charger. Have qualified installer check AC line voltage switch setting. Setting must agree with AC voltage at site.
3	T-COMP	GREEN	On if Temperature Compensation Working, Off if Temperature Compensation Option not used.	Confirm if temperature compensation is intended to be used. Only one sensor (Local or remote) should be connected.
4	AC/ON	GREEN	Charger is on-line and operating normally	This LED should agree with the alarm relay: On = OK, off = Fail
5	FLOAT MODE	GREEN	Charger Output in Float (maintenance) Mode	This LED will come on after the battery is charged. It remains on
6	BOOST MODE	AMBER	Charger Output in Boost (recharge) Mode	This LED will be off when the battery is at full charge.
7	BATT FAULT	RED	Battery Fault-Charger automatically disabled	Battery reversed High resistance in charger leads (leads too small, too long, poorly connected, open) Battery internal open circuit. Battery voltage does not match charger voltage range.

Select the voltmeter function by sliding the meter switch to the “V” position.

- A. Apply AC power by closing the branch circuit breaker and any other disconnect devices. The meter display should light immediately after power on and display the battery voltage. The green AC/ON LED should light. The green T-COMP (Temperature Compensation) LED should light.
- B. After a short delay (typically 10 seconds or less), the charger will produce output. The voltmeter reading should increase, indicating the battery is being charged.
- C. Change the meter switch to the “A” position to read output current. Current should be close to 10A if the battery requires recharging. The BOOST MODE LED may light, in which case the battery will be charged until it reaches the fast charge voltage setting. Output current will be low if the battery is fully charged, possibly too low to read on the meter. This is normal, provided the correct charging voltage is present. The green FLOAT MODE LED should light when output current is below approximately 5 A.

**NOTE:** It is critical that all leads from the battery charger to the battery terminals be tight and free of corrosion. Loose terminals or corroded terminals will result in a battery charger fault or unreliable charger operation. Total

loop resistance of the wire from the controller to the batteries should not exceed .056 ohms. Larger wire than 10AWG may be required if the distance to the batteries is significant.