

## **INSTALLATION AND OPERATING INSTRUCTIONS FOR**



# **FP**

## **MOTIVE POWER BATTERY AND CHARGER SYSTEM**

### **1. SAFETY**

- 1.1 Follow your company's Safety Instructions when working with or near industrial truck batteries. Observe the caution label affixed to the battery. Thoroughly familiarize yourself with industry and government guidelines (OSHA, ANSI) for charging, handling, and maintaining industrial batteries.
- 1.2 Assign battery and charger care to properly trained personnel.
- 1.3 This battery contains sulfuric acid electrolyte. Avoid contact with skin, eyes, or clothing. Wear rubber apron, gloves, boots, and goggles or face shield when handling, checking, filling, charging or repairing batteries.
- 1.4 Keep water readily available for flushing spilled electrolyte from eyes or skin. Use plain water only and obtain medical attention immediately. Special deluge showers and eye washbasins are required.
- 1.5 Batteries produce hydrogen and oxygen gas during charge. Keep open flames away. Do not check electrolyte level with a cigarette lighter or match. Use a flashlight or permanent lights. Switch on/off away from the top of the battery. Do not smoke or create sparks.
- 1.6 Lift batteries with a certified/approved hoist, crane, lift truck, or similar equipment. Move batteries with trucks, conveyors, or rollers. Be sure to place a rubber mat or similar insulating material across the tops of coverless batteries when handling. Make sure equipment is of ample strength and properly installed.

### **DO NOT USE CHAIN OR WIRE ROPE SLINGS.**

- 1.7 Never lay metal tools, such as wrenches or screwdrivers, on top of a battery.
- 1.8 Disconnect the battery from the truck when performing maintenance and repair on motor or electrical system.
- 1.9 Open or "break" the battery circuit before attempting repairs to the charging plug or receptacles.
- 1.10 Apply a strong neutralizer, such as baking soda or soda ash, when electrolyte is spilled on the floor. Check local regulations regarding the disposal of neutralized waste.

## 2. RECEIVING BATTERIES

Immediately upon receipt of shipment, examine the outside of the packing for signs of rough handling before accepting the battery from the carrier. Wet spots on the shipping pallet may be an indication of leaking jars broken in shipment.

If there is evidence of damage, the receipt should be signed and both copies (carrier's and receiving copies) marked "Shipment Received Damaged". The carrier should be called immediately and asked to make a "Carrier's Inspection for Damage Report".

If "concealed" damage is later detected, the carrier should be called immediately and requested to make a "Carrier's Inspection for Concealed Damage Report". After inspection by the carrier, arrangements should be made with the local GNB Industrial Power representative to have the battery repaired before placing it in service.

**BEFORE PLACING BATTERIES IN SERVICE,  
REVIEW AND FOLLOW THE SAFETY GUIDELINES LISTED IN SECTION 1.**

## 3. PLACING IN SERVICE

Verify that the battery weight meets or exceeds the minimum truck weight requirements. Allow the battery to cool or warm to room temperature before charging or adding water.

Open the vent caps from each cell and check to see that the electrolyte level is above the plate separators. If it is obvious that the electrolyte has spilled out of any cells, replace it with electrolyte of the same specific gravity as found in the other cells of the battery (1.280 – 1.290). Close the vent caps and give the battery a freshening charge until there is no increase in specific gravity for three hydrometer readings taken at one-hour intervals.

During shipment of the battery, low temperatures and/or normal shock and vibration often results in a drop in the electrolyte level. If the level is below the plate separators, recheck it after 3 hours of charging. If the level remains below the plate separators, add water or electrolyte to the proper level at the end of charging.

Following the first 90 days of service, the battery should reach its normal operating specific gravity of 1.285 to 1.345 at 77°F (25°C).

**IF BATTERIES ARE NOT IN REGULAR USE, KEEP THEM CHARGED.  
CHECK THE SPECIFIC GRAVITIES MONTHLY AND GIVE THE BATTERY A FRESHENING  
CHARGE (3 OR 4 HOURS AT THE FINISH RATE) IF THE GRAVITIES HAVE FALLEN 0.030  
OR MORE; OTHERWISE GIVE A FRESHENING CHARGE EVERY THREE MONTHS.**

## 4. OPERATION

Batteries are rated in ampere-hours (Ahr) and are selected to perform a specific workload within an established period of time. Increasing the workload or time period could result in over discharging, thus shortening battery life. Limit discharging of the battery (to 80% or less) so that specific gravities do not go below 1.180. If truck operation results in only partial discharges (40% or less) and specific gravities are 1.250 or more at the end of the shift, recharging may be deferred and the battery used for another shift, providing the workload is not expected to increase. Hydrometer readings and experience will determine the frequency of charge intervals under these circumstances.

A battery should always be recharged immediately following a complete discharge. Never allow it to remain in a discharged condition; otherwise, permanent damage may result. A battery is designed to be operated as follows:

- 8 hours discharge
- 8 hours charge
- 8 hours cool-down

Tubular-LM Low Maintenance batteries are designed and built to deliver 80% of their rated capacity at 77°F (25°C) each cycle.

## 5. TEMPERATURE

In the operation of motive power lead acid batteries, the electrolyte temperature must not exceed 110°F (43°C). If the battery is continuously operated at or above this temperature, the service life of the battery will be severely diminished. Under normal operating conditions, battery electrolyte temperature should be maintained between 60-100°F (15-38°C). Following charging, the battery should be allowed to cool-down or rest approximately 8 hours prior to another discharge cycle.

If a battery is ever hot to the touch, allow it to cool to room temperature before charging or discharging. If a battery consistently operates at high temperatures greater than 100°F (38°C), contact your local GNB Industrial Power representative for service.

## 6. CHARGING

The battery should be charged exclusively with the charger provided with the system.

**WHEN BATTERY RECHARGE IS REQUIRED, PLUG THE BATTERY CABLE CONNECTOR INTO THE CHARGER CABLE CONNECTOR AND THEN PLUG THE 3-PRONG CHARGER POWER CORD INTO A GROUNDED 120 VOLT 15 AMP 50 HZ OR 60 HZ POWER OUTLET.**

The charger is equipped with an LED indicator to show the progress of the charging cycle.

RED LED shows that the battery is in the initial charging phase.  
YELLOW LED shows that the battery has reached 80% of charge.  
GREEN LED shows that the battery has reached 100% of charge.

The Tubular-LM FP charging algorithm includes an unterminated Float Stage that begins automatically once full charge is complete. The Float Stage holds the battery at 2.28 volts per cell (VPC) until the battery is required for service. The result is that the battery is maintained at full state of charge which helps to prevent self-discharge and sulfation.

**WHEN IT IS TIME TO PUT THE BATTERY INTO SERVICE, REMOVE THE BATTERY FROM THE CHARGER BY UNPLUGGING THE CHARGER POWER CORD FROM THE POWER OUTLET AND THEN DISCONNECT THE CHARGER CABLE FROM THE BATTERY CABLE.**

High “on charge” temperatures or frequent need for water additions are indications of overcharging. Short running times and/or low end-of-charge specific gravities may indicate inadequate recharge. Consult your local GNB Industrial Power representative on specific charging problems.

If the charger does not work correctly or if it has been damaged, unplug it immediately from the power outlet and contact your local GNB Industrial Power service representative.

The charger may be provided with a thermal sensor connected to the top of the battery. With this sensor, the charging profile will automatically compensate for variable battery temperatures. Do not disconnect the sensor from the top of the battery or the charger.

The charger is equipped with a two-tone audible alarm. In the event of an alarm condition, the audible alarm will sound and the LED indicator will flash. Possible alarm conditions are:

| <b>Condition</b>                            | <b>Alarm Type</b> | <b>Description (Action)</b>  |
|---|-------------------|--|
| Audible message<br>+ RED flash              | Battery Presence  | Battery disconnected or not in conformity. (Verify the connection and the nominal voltage).  |
| Audible message<br>+ YELLOW flash           | Thermal Sensor    | The thermal sensor is disconnected during the recharge or it is out working range. (Verify the connection of the sensor and measure the temperature of the battery). |
| Audible message<br>+ GREEN flash            | Timeout           | Phase 1 and/or Phase 2 have a duration in excess of the maximum allowed. (Verify the battery capacity).  |
| Audible message<br>+ RED-YELLOW flash       | Battery Current   | Loss of output Current control. (Failure of the control logic).  |
| Audible message<br>+ RED-GREEN flash        | Battery Voltage   | Loss of output Voltage control. (Battery disconnected or failure of the control logic).  |
| Audible message<br>+ YELLOW -GREEN flash    | Selection         | An unavailable configuration has been selected (Verify the selector’s position).   |
| Audible message<br>+ RED-YELLOW-GREEN flash | Thermal           | Overheating of semiconductors. (Verify the fan operation).   |

When there is an alarm, the charger stops supplying current to the battery.

**DO NOT INTERMITTENTLY CHARGE, "OPPORTUNITY CHARGE",  
OR SHORT CYCLE THIS BATTERY.**

**7. CONNECTIONS**

The battery cells are connected in series using welded lead connectors.

**8. MAINTENANCE**

**KEEP RECORDS...** Showing charging dates and times. After each watering, record the specific gravity, temperature, and open circuit voltages for each cell of the battery. These records are required to maintain your warranty.

**TEMPERATURE...** Under normal operating conditions, the electrolyte temperature should be between 60-100°F (15-38°C). Operating temperatures above 100°F will reduce the battery's service life. Operating temperatures below 60 °F result in less capacity and special charging is required.

**WATER ADDITIONS...** After each 5 calendar days of operation to 80% DOD or when the specific gravity in the cells reaches 1.335 to 1.345, check the water level in each cell after the end of the charging period (when the battery is fully charged and the charger has tapered to its finish rate) and add water, if necessary, as specified in Section 10 in this manual. The watering interval may increase depending on how you use the system.

**DEPTH OF DISCHARGE...** Do not discharge the battery beyond 80% of the rated ampere-hour capacity. Over discharging shortens the battery life and voids the warranty.

**CLEANING...** Keep the top of the battery clean and dry. See Section 9.

**CHARGER...** Do not try to service the charger yourself. Opening the cover may expose you to shocks or other hazards and will void the warranty.

**PREVENTIVE MAINTENANCE SCHEDULE...**  
**(based on five 80% DOD duty cycles per week)**

|                       |  |
|-----------------------|--|
| <b>EVERY 45- DAYS</b> | Check cell electrolyte levels and add water to each cell.  |
|                       | Record cell electrolyte specific gravities, temperatures, and open circuit voltages after watering.                                  |
|                       | Inspect the cables and charging plugs.   |
|                       | Clean the top of the cells.  |
| <b>ANNUALLY</b>       | Inspect the charger. Confirm proper output voltage and current. Check for external damage, frayed or cut cables, or worn connectors. |
|                       | Clean the exterior of the battery.   |

**TROUBLE SIGNS...**

The battery temperature rises more than 25°F (14°C) during a normal charge.

The cell open circuit voltages vary by 0.15 volts or more.

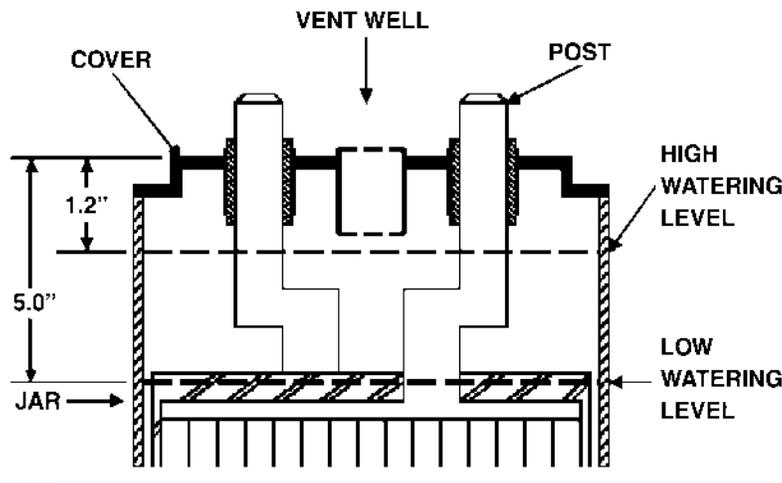
The top of the battery is always wet or one cell requires excessive watering.

## 9. MAINTENANCE CLEANING

The top of the battery should be kept clean and dry. Keep the vent caps in place during use and charging. Remove the vent cap only to observe electrolyte levels, make water additions, take temperatures, or take specific gravity readings with a hydrometer. If the battery requires cleaning, contact your local GNB Industrial Power servicing representative. The solution used to clean and neutralize the outside of the batteries should be disposed of in an environmentally safe manner.

## 10. WATER ADDITIONS

Maintain electrolyte levels above the plate separators, but no higher than 1/8" from the bottom of the vent well. Check the electrolyte level quarterly, or as necessary depending on battery use prior to charging. If the level is not visible (below the plate separators), add just enough water to cover them and then proceed with charging the battery. Otherwise, defer watering the battery until the end of the charging period when the battery is fully charged and the charger has tapered to its finish rate. At that time, add enough water to bring the electrolyte level to 1.2" of the top of the cover. Always use distilled water or water that is known to be free of abnormally high amounts of impurities. Contact your local GNB Industrial Power representative if you are not sure of your water quality.



**BATTERIES MUST BE VISUALLY INSPECTED PER THE ABOVE SCHEDULE EVEN WITH THE USE OF A WATERING SYSTEM.**

### Before watering

- Make sure that the battery is disconnected from all charging equipment.
- Make sure that the battery is properly cleaned.
- Make sure that you are working with safety glasses.

**WATER ONLY AFTER CHARGING.**

## **11. SERVICE AND PARTS**

Your local GNB Industrial Power sales representative has more information regarding the full range of maintenance and repair service available. GNB Industrial Power can also supply all of your battery, charger, and accessory device replacement part needs. For more information in the U.S.A. and Canada, call 1-888-563-6300. All others, please contact your local GNB Industrial Power battery sales representative.

## **12. RECYCLING**

U.S. Federal and State Regulations require that lead acid batteries be handled and disposed of in compliance with strict guidelines. GNB Industrial Power offers disposal service for lead acid batteries. Call 1-888-438-5865 to arrange a pick-up or to get additional information.

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# GNB Industrial Power – The Industry Leader.



GNB® FUSION™

GNB Industrial Power, a division of Exide Technologies, is a global leader in motive power battery and charger systems for electric lift trucks and other material handling equipment. With a strong manufacturing base in both North America and Europe and a truly global reach (operations in more than 80 countries) in sales and service, GNB Industrial Power is best positioned to satisfy your power needs locally as well as all over the world.

Based on over 100 years of technological innovation, the Motive Power group leads the industry with the most recognized global brands, such as GNB® FLOODED CLASSIC®,

GNB® FLOODED CLASSIC PLATINUM™, TUBULAR-HP® HIGH PERFORMANCE, TUBULAR-LMT™ LOW MAINTENANCE, ELEMENT® and GNB® FUSION™. They have come to symbolize quality, reliability, performance and excellence in all the markets served.

GNB Industrial Power takes pride in its commitment to a better environment. Its Total Battery Management program, an integrated approach to manufacturing, distributing and recycling of lead acid batteries, has been developed to help ensure a safe and responsible life cycle for all of its products.

## GNB Industrial Power

USA – Tel: 877.462.4636

Canada – Tel: 800.268.2698

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