08-1026 Battery Installation Instructions for Legacy Gauges

The 8.4V NiMH 08-1026 battery is designed for use with new Mark-10 gauges. They can also be used with legacy gauges, however, some modifications are required. Failure to perform this modification will not cause damage to the gauge, however, the period of time per battery charge will be significantly reduced. Applicable legacy gauge series include Series BG, BGI, EG, and CG. Refer to the instructions below:

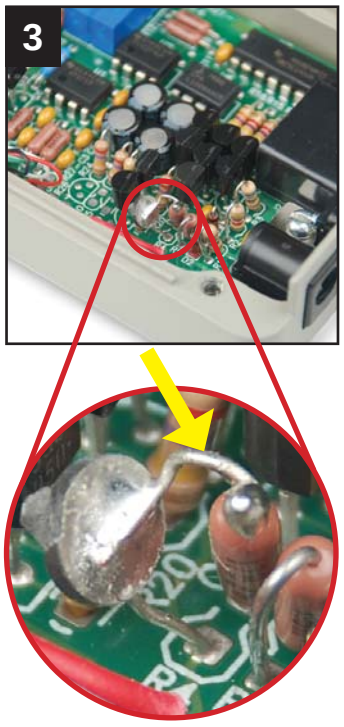
1

Separate the two halves of the gauge housing by loosening the captive screws. Then pull the two halves apart.

2

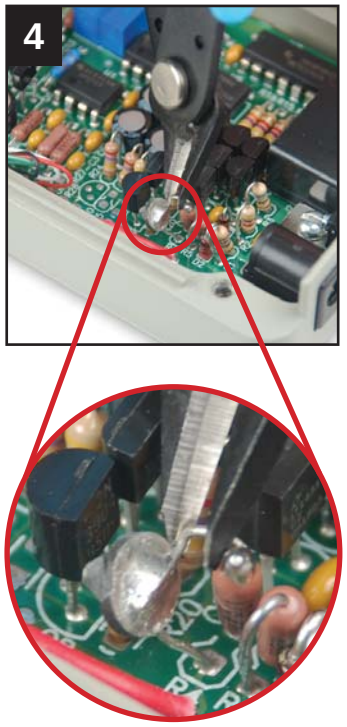
The separated halves appear as above. The PCB of interest is the auxiliary PCB, shown on the right half, adjacent to the battery. Remove the battery before beginning work on the modifications.

3



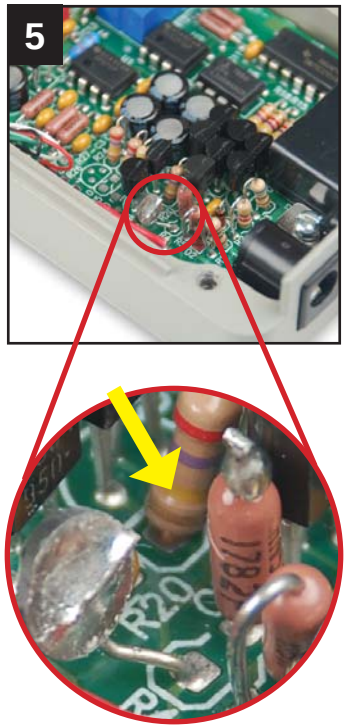
Identify the R4 resistor (brown color), with the thermistor (silver color) soldered to it. The connection between the two components is highlighted with a yellow arrow.

4



Using a pair of wire cutters, cut the connection between the components.

5



Twist the thermistor away from the resistor, or cut it out completely. Note the absence of the connection, identified by the yellow arrow. Then, install the new battery and reassemble the two halves of the housing.

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8.4V

NIMH Battery Material safety data sheet

I - Product Identification and company/undertaking

Product Name: **Nickel Metal Hydride (NIMH) Rechargeable Battery**
Brand: TENERGY
Chemical System Nickel/Metal Hydride
Nominal Voltage: 1.2V
Designated for Recharge: X Yes ___No
Effective Date: 05.08.2006

II - Hazardous Ingredients

IMPORTANT NOTE: The product is a manufactured article as described in 29 CFR 1910.1200. The battery cell is contained in a hermetically-sealed case, designed to withstand temperatures and pressures encountered during normal use. As a result, during normal use, hazardous materials are fully contained inside the battery cell. The battery cell should not be opened or exposed to heat because exposure to the following ingredients contained within could be harmful under some circumstances. The following information is provided for the user's information only.

Chemical Name	CAS No.	OSHA PEL (mg/m^3)	ACGIH TLV (mg/m^3)
Nickel (powder)	7440-02-0	1TWA	1 TWA
Nickel hydroxide	12054-48-7	1 TWA	1 TWA
Cobalt	7440-48-4	0.1 TWA	Dust & Fume 0.005
Manganese	7439-96-5	Fume: 5 Ceiling Limit	Dust: 5 Fume: 1
Lanthanum	7439-91-0	NA	NA
Cerium	7440-45-1	NA	NA
Neodymium	7440-00-8	NA	NA
Potassium hydroxide	1310-58-3	NA	2 Ceiling Limit
Sodium hydroxide	1310-73-2	2 TWA	2 Ceiling Limit
Lithium hydroxide	1310-65-2	NA	NA

The information and recommendations set forth are made in good faith and believed to be accurate as of the date of preparation. **TENERGY CORPORATION** makes no warranty, expressed or implied, with respect to this information and disclaims all liabilities from reliance on it.

Notes: 1. Concentrations vary depending on the state of charge or discharge.
2. TWA is the time weighted average concentration over an 8-hour period.

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III — Physical Data for Battery

Melting point (¡F) NA	Boiling point (¡F) NA	% Volatile by Volume NA
Vapor Pressure (mm Hg) NA	Evaporation Rate Vapor	Density (Air = 1) NA
Specific Gravity (H2O) NA	Solubility in Water NA	Appearance and Odor No Odor

IV - Fire and Explosion Hazard Data

Flash Point: NA Lower Explosive Limit: NA Upper Explosive Limit: NA
Extinguishing Media: Any class of extinguishing medium may be used on the batteries or their packing material. Special Fire Fighting Procedures: Exposure to temperatures of above 212F can cause venting of the liquid electrolyte.
Internal shorting could also cause venting of the electrolyte. There is potential for exposure to iron, nickel, cobalt, rare earth metals (cerium, lanthanum neodymium, and praseodymium), manganese, and aluminum fumes during fire; use self-contained breathing apparatus.

V – First Aid Measures

If electrolyte leakage occurs and makes contact with skin, wash with plenty of water immediately.
If electrolyte comes into contact with eyes, wash with copious amounts of water fifteen (15) minutes, and contact a physician.

VI - Health Hazard Data

Threshold Limit Values: See Section II
Effects of a Single (Acute) Overexposure:
Inhalation: During normal use inhalation is an unlikely route of exposure due to containment of hazardous materials within the battery case. However, should the batteries be exposed to extreme heat or pressures causing a breach in the battery cell case, exposure to the constituents may occur. Inhalation of cobalt dusts may result in pulmonary conditions.
Ingestion: If the battery case is breached in the digestive tract, the electrolyte may cause localized burns.
Skin Absorption: No evidence of adverse effects from available data.
Skin Contact: Exposure to the electrolyte contained inside the battery may result in chemical burns. Exposure to nickel may cause dermatitis in some sensitive individuals.
Eye Contact: Exposure to the electrolyte contained inside the battery may result in severe irritation and chemical burns.
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Carcinogenicity:

Nickel has been identified by the National Toxicology Program (NTP) as reasonably anticipated to be a carcinogen. Cobalt has been identified by IARC as a 2Bcarcinogen. Other Effects of Repeated

(Chronic) Exposure:

Chronic overexposure to nickel may result in cancer; dermal contact may result in dermatitis in

sensitive individuals.

Medical Conditions Aggravated by Overexposure:
A knowledge of the available toxicology information and of the physical and chemical properties of the material suggests that overexposure in unlikely to aggravate existing medical conditions.

Emergency and First Aid Procedures:

Swallowing: Do not induce vomiting. Seek medical attention immediately.
Skin: If the internal cell materials of an opened battery cell come into contact with the skin, immediately flush with water for at least 15 minutes.

Inhalation: If potential for exposure to fumes or dusts occurs, remove immediately to fresh air and seek medical attention.

Eyes: If the contents from an opened battery come into contact with the eyes, immediately flush eyes with water continuously for at least 15 minutes. Seek medical attention.

Section VII - Reactivity Data

The batteries are stable under normal operating conditions.

Hazardous polymerization will not occur.

Hazardous decomposition products: oxides of nickel, cobalt, manganese, lanthanum, and

cerium. Conditions to avoid: heat, open flames, sparks, and moisture.

Potential incompatibilities (i.e., materials to avoid contact with): The battery cells are encased in a non-reactive container; however, if the container is breached, avoid contact of internal battery components with acids, aldehydes, and carbamate compounds.

VIII - Spill and Leak Procedures

Spill and leaks are unlikely because cells are contained in an hermetically-sealed case. If the battery case is
breached, don protective clothing that is impervious to caustic materials and absorb or pack spill residues in inert material. Dispose in accordance with applicable state and federal regulations.

VIX - Safe Handling and Use (Personal Protective Equipment)
Ventilation Requirements: Not required under normal use.

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Expressed or implied, with respect to this information and disclaims all liabilities from
reliance on it. Respiratory Protection: Not required under normal use.
Eye Protection: Not required under
normal use. Gloves: Not required under
normal use.

X- Precautions for Safe Handling and Use

Storage: Store in a cool place, but prevent condensation on cell or battery terminals. Elevated temperatures may result in reduced battery life. Optimum storage temperatures are between -31F and 95F.

Mechanical Containment: If there are special encapsulations or sealing requirements, consult your Tenergy Corporation representative about possible cell hazard precautions or limitations.
Handling: Accidental short circuit will bring high temperature elevation to the battery as well as shorten the battery life. Be sure to avoid prolonged short circuit since the heat can burn attendant skin and even rupture of the battery cell case.
Batteries packaged in bulk containers should not be shaken. Metal covered tables or belts used for assembly of batteries into devices can be the source of short circuits; apply insulating material to assembly work surface. If soldering or welding to the case of the battery is required, consult your **TENERGY CORPRATION** representative for proper precautions to prevent seal damage or external short circuit.

Charging: This battery is designed for recharging. A loss of voltage and capacity of batteries due to self-discharge during prolonged storage is unavoidable. Charge battery before use. Observe the specified charge rate since higher rates can cause a rise in internal gas pressure which may result in damaging heat generation or cell rupture and/or venting.
Labeling: If normal label warnings are not visible, it is important to provide a device label stating: CAUTION: Do not dispose in fire, mix with other battery types, charge above specified rate, connect improperly, or short circuit, which may result in overheating, explosion or leakage of cell contents.

XI – Measures for fire extinction

In case of fire, it is permissible to use any of extinguishing medium on these batteries or their packing material .Cool exterior of batteries if exposed to fire to prevent rupture. Fire fighters should wear self-contained breathing apparatus

XII – Ecological information

N.A

XIII - Recycling and Disposal

Tenergy Corporation encourages battery recycling. Our Nickel Metal Hydride batteries are not defined by the federal government as hazardous waste and are safe for disposal in the normal municipal waste stream.

DO NOT INCINERATE or subject battery cells to temperatures in excess of 212F. Such treatment can cause cell rupture.

XIV – Transportation
Tenergy Corporation sealed Nickel Metal Hydride batteries are considered to be "dry cell" batteries and are not subject to dangerous goods regulation for the purpose of transportation by the U.S. Department of Transportation (DOT), the International Civil Aviation Organization (ICAO), the International Air Transport Association (IATA) or the International Maritime Dangerous Goods regulations (IMDG). More information concerning shipping, testing, marking and packaging can be obtained from Labelmaster at

http://www.labelmaster.com. IATA requires that batteries being transported by air must be protected from short-circuiting and protected from movement that could lead to short-circuiting.

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XV – Regulatory Information

Special requirement be according to the local regulatory

XVI – Other Information

The data in this Material Safety Data Sheet relates only to the specific material designated herein

Specification Approval Sheet

Name: Nickel-Metal Hydride Battery

Model: 10003

SPEC: 8.4V (9V size) 200mAh LSD Cell

File Number:/

Project: /

Approved By	Checkup	Make
Andy	/	Haixia Bi
2016-7-13	/	2016-7-13

	Signature	Date
Customer Confirmation	**Company Name：**	
	Stamp：	

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Amendment Records

Revision	Description	Issued Date	Approved By
A/0	New release	2016-5-23	Haixia Bi
A1	Update the battery performance parameters	2016-7-13	Haixia Bi

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1 Scope

This document describes the performance characteristics and testing methods for Nickel-Metal Hydride battery produced by Tenergy Corporation.

2 Product type and model number

2.1 Product type

Nickel-Metal Hydride Battery

3 Rated performance

Form 1: Battery rated performance

No	Item	Rated performance	Remark
1	Rated capacity	Nominal 200mAh Min 200mAh-5%	Standard discharge after standard charge
2	Nominal voltage	8.4V	Mean operation voltage during standard discharge after standard charge
3	Voltage at end of discharge	7V	Discharge cut-off voltage
4	Charging voltage	10.5V	
5	Impedance	≤750 mΩ	
6	Standard charge	Constant current 0.1 C_5A Constant voltage 10.5V Cut-off current ≤0.03C_5A	
7	Standard discharge	Constant current 0.2 C_5A End voltage7V	
8	Fast charge	Constant current 0.5C_5A Constant voltage10.5V Cut-off current ≤0.03C_5A	
9	Fast discharge	Constant current 0.5 C_5A End voltage7V	
10	Maximum continuous discharge current	2C	
11	Operation temperature range	Charge: 0~45℃	65±20%R.H
		Discharge: -20~50℃	
12	Cycle life	>500cycles	IEC61951-2(2003)7.4.1.1
13	Storage temperature	≤1 month: -20 ~ 60℃	65±20%R.H， Best 10~25℃ for long-time storage
		≤3 months: -20 ~ 40℃	
		≤1 year:20 ~ 30℃	
14	Weight	Approx: ≈36g	
15	Dimension(mm)	Thickness*Width*Height(Max)	16.5*26*48mm
16	output wire length（mm）	Excluding the connector	/±5mm

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4 Electrical performances

Form 2: Battery electrical performances

Table 5-Endurance in cycles

No	Items	Test procedure	Requirements
1	Nominal voltage	The average value of the working voltage during the whole discharge process.	8.4V
2	Discharge performance	The discharge capacity of the battery, measured with 0.2 C_5A down to 7V within 1 hour after a standard charge at 25±5℃	Discharge ≥Minimum capacity
3	Capacity retention	Standard charge, storage for 28 days, standard discharge at 45℃	≥80%
		Standard charge, storage for 1 year, standard discharge at 20℃	≥80%
4	Cycle life	IEC61951-2(2003)/7.4.1.1	>500cycles

Notes: IEC61951-2(2003)/7.4.1.1 Cycle Life Test:

Cycle number	Charge	stand in Charged condition	Discharge
1	0.1 C5A，16h	none	0.25 C5A ,2h 20min
2—48	0.25 C5A，3h10min	none	0.25 C5A ,2h 20min
49	0.25 C5A，3h10min	none	0.25 C5A to 1.0V/cell
50	0.1 C5A，16h	1h-4h	0.2 C5A to 1.0V/cell
Cycle 1 to 50 shall be repeated until the discharges duration on any 50th cycle becomes less than 3hrs			

5 Standard test conditions

Test should be conducted with new batteries within one week after shipment from our factory and the batteries shall not be cycled more than five times before the test. Unless otherwise defined, test and measurement shall be done under temperature of 20±5℃ and relative humidity of 45~85%. If it is judged that the test results are not affected by such conditions, the tests may be conducted at temperature 15~30℃ and humidity 25~85%RH.

6 Cautions in use

To ensure proper use of the battery please read the manual carefully before using it.

6.1 Handling

Do not expose to, dispose of the battery in fire.

Do not put the battery in a charger or equipment with wrong terminals connected.

Avoid shorting the battery.

Avoid excessive physical shock or vibration.

Do not disassemble or deform the battery.

Do not immerse in water.

Do not use the battery mixed with other different make, type, or model batteries.

Keep out of the reach of children.

6.2 Charge and discharge

Battery must be charged in appropriate charger only.

Never use a modified or damaged charger.

Do not leave battery in charge over 24 hours.

6.3 Storage

Store the battery in a cool, dry and well-ventilated area.

6.4 Disposal

Regulations vary for different countries, Dispose of in accordance with local regulations.

7 Battery operation instruction

7.1 Charging

Charging current：Cannot surpass the biggest charging current which in this specification book stipulated.

Charging voltage：Does not have to surpass the highest amount which in this specification book stipulated to decide the voltage.

Charging temperature: The battery must charge in the ambient temperature scope which this specification book stipulated. Use the constant electric current and constant voltage to charge. Do not reverse charge. When the positive electrode and the cathode meet together, damage can be made for the battery.

7.2 Discharging current

The discharging current does not have to surpass this specification book stipulation the biggest discharging current, the oversized electric current electric discharge can cause the battery capacity play to reduce and to cause the battery heat.

7.3 Electric discharge temperature

The battery discharge must carry on in the ambient temperature scope which this specification book stipulated.

7.4 Over-discharges

Short time of excessively discharge will not affect the usage. But the long time excess discharge can damage the battery performance and cause the function losing. When the battery is not used for a long time, because of its automatic flashover characteristic, it may excessively discharges. To prevent excessively discharge occur, the battery should maintain certain electric quantity.

7.5 Storing the batteries

The battery should store in the product specification book stipulation temperature range. If has surpasses above for six months the long time storage, suggested you should carry on additional charge to the battery.

8 Other the chemical reaction

Because batteries utilize a chemical reaction, battery performance will deteriorate over time even if stored for a long period of time without being used. In addition, if the various usage conditions such as charge, discharge, ambient temperature, etc. are not maintained within the specified ranges the life expectancy of the battery may be shortened or the device in which the battery is used may be damaged by electrolyte leakage. If the batteries cannot maintain a charge for long periods of time, even when they are charged correctly, this may

indicate it is time to change the battery.

9 Note

Any other items which are not covered in this specification shall be agreed by both parties.