

BAT.MAN Ai

For Android & iOS

USER MANUAL

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Introduction

Thank you for purchasing BAT.MAN Ai device.

This device is designed to display the usage conditions of the sub-battery installed in the vehicle with smartphones.

In order to enjoy the comfortable leisure life by using this device, please read this user manual carefully before using the device.

Safety Precautions

If you operate this device incorrectly by ignoring the following cautions, it may cause fire and/or any personal injury.

- ! Since the device is designed only for usage with the sub-batteries of the camping car, it cannot be used for any driving and starter batteries.

- ! Please don't use for different usage from this manual.
Installation and wiring of this device and the sub-battery is necessary to be careful on safety.
Incorrect installation or improper connection may cause a malfunction or permanent damage for the electric equipment and electric parts inside this device.

- ! Keep the terminals (bolts and butterfly nuts) of the device away from the peripheral metal parts and the metal fittings when setting up the device. A circuit will be broken and it may cause fire or personal injury.

- The main body of the device consists of resin sealant structure.
Do not drop it or strike it against hard objects. It could damage the device.

- Make sure all cable (wiring) to the device or sub-battery are properly connected as the large current flows the terminal (bolt). (Please refer to P.5-6 "Installation")
If connected improperly, it may cause a malfunction, heating of the peripheral terminal damage for the device.

- The device will consume a current of about 10mA. In case of not using long time, please refer to P.14 "Treatment for not Using a Long Interval".

- As the antenna to communicate the smartphone is inside of this device, the device must be used and kept away from the peripheral metal objects. Otherwise it may not be able to display the state of the sub-battery properly.

- Do not store the device in a hot temperature or high humidity environment to protect this device from the deterioration.

Characteristics

Voltage, current, electric power, and the amount of the energy can be confirmed at a glance.

The electric power consumption of microwave oven, air-conditioner, light and audio etc. in conjunction with spread of camping car and leisure boat, is large. And so, as it is large load for sub-batteries, users feel inconveniences.

The number of users who install a solar panel, is increasing gradually. However, it is hard that the condition of charging to the battery is not clear.

As BAT.MAN is the sensor of the size of the palm of a hand, it is easy to install in the sub-battery. BAT.MAN measures the voltage and current timely and by using Bluetooth, smartphone displays the battery voltage, current, power consumption, energy level and condition of charge and discharge with animation and numerical value.

Features and Functions

-BAT.MAN Ai-

- Easy to install without any tools.
- Can be mounted to a maximum of 10 pairs of sub-batteries. (BAT.MAN Ai is required for each pair of batteries)
- Can be used for 12V and 24V type of sub-batteries.
- Can be used for equipment with peak currents of up to 200A.
12V sub-battery : Up to 1kW
24V sub-battery : Up to 2kW
- Resistant to water, vibration and dust with perfect resin sealing structure.
- No complicated wiring, No shunt resistors for detecting current.

-Smartphone App (Android & iOS)-

- Can be used anywhere inside the vehicle via wireless Bluetooth.
- Can be monitored by multiple smartphones at the same time.
(Android/iOS devices can be used interchangeably and concurrently)
- The condition of up to a maximum of 10 pairs of sub-batteries can be monitored at the same time on a single smartphone.
- The voltage, current, power, energy level and temperature of the sub-batteries are displayed in animation.
- The charging status of the sub-batteries can be monitored while driving.
- The charging status by such things as solar panels, and the discharging status are displayed in animation.
- Low voltage warning system of the sub-battery. (Function will notify users by setting of sound and vibration)

Usage Guidelines

In order to use BAT.MAN Ai safely, please use it and keep the following usage guidelines.

- It can only be used for the Sub-Batteries.

The following sub-batteries are available.

Battery type	Only for lead batteries (include Deep cycle batteries)
Battery voltage	12V and 24V
Battery capacity	Up to 50A-105Ah each battery-compliant. (the parallel connected type is compatible) Note: Cannot be used on a system with a peak current of 200A and over.
Battery terminal configuration	Negative terminal M8 screw Positive terminal M8 or M10 screw compatible. Note: In case the terminal configuration is not a screw type, you need to purchase something additional such as a screw type conversion adapter.

- The earth potential (chassis potential of the vehicle body) is only available for the vehicle body of a negative. Earth potential which is the vehicle of body of a positive cannot be used.

Compatible smartphones

	AndroidOS	iOS
OS version	Android 5.0 recommended Android 4.4 or later	iOS 8 or later
Bluetooth version	Bluetooth v4.0 BLE or later	
Operation confirmation model	Xperia Z1,Z3,X Performance Ascend mate7 NEXUS 6	iPhone4S iPhone5/5S iPhone6 / 6 plus iPhone6S / 6S plus iPad mini iPad Air

- ✗ **Do not mount on the driving battery.**

For safety's sake, the device cannot be used with the batteries of the engine starter and controller.

- ✗ **Sub-batteries with a peak current of 200A and over cannot be mounted.**

When the peak current is over 200A, it may cause a destruction, heating of the device and damage and malfunction of the other equipment.

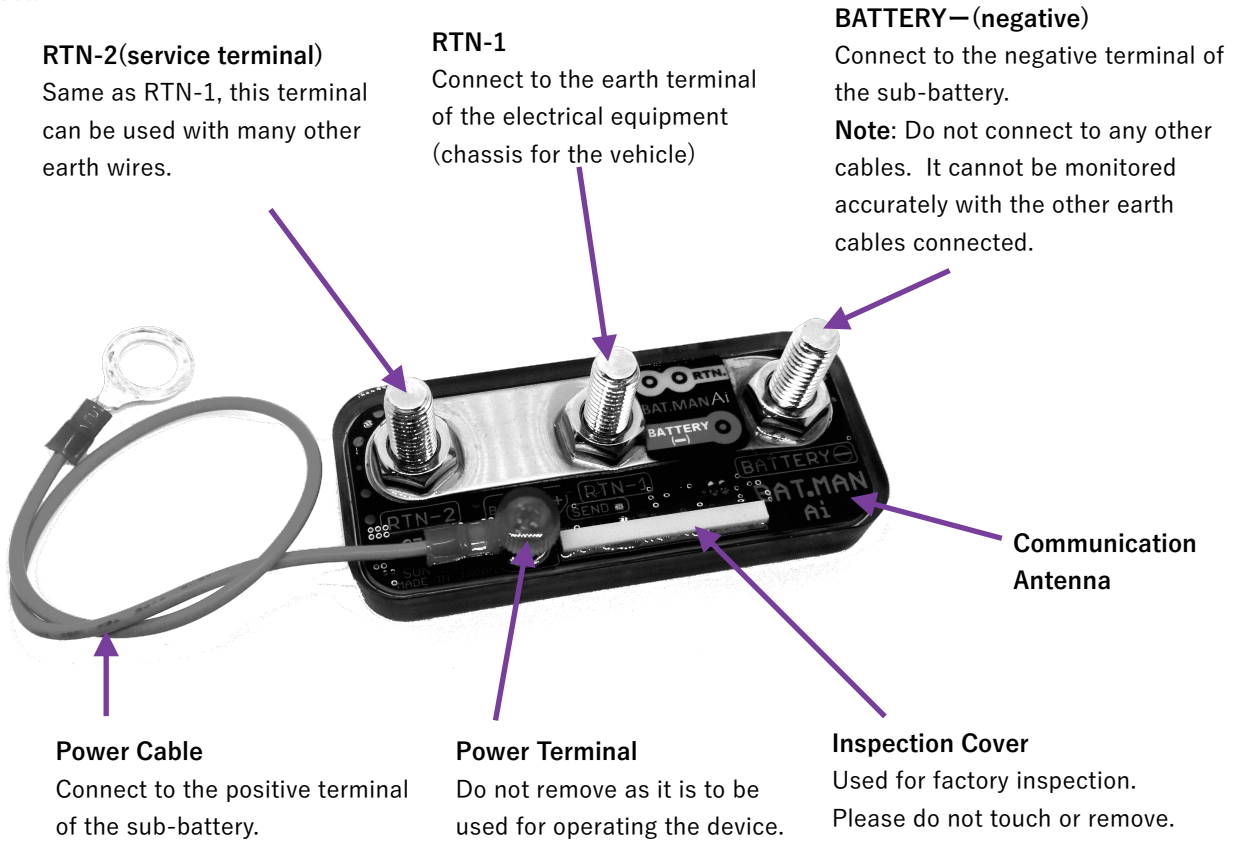
Total power consumption of using equipment should be following.

12V sub-battery: Up to 1kW



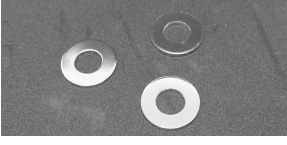

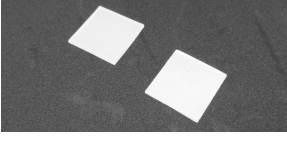
24V sub-battery: Up to 2kW

Name of each Part

BAT.MAN Ai



Accessories List

	<p>Battery metal fitting × 1 piece Material : Copper + Tin plate</p>
	<p>Butterfly nut × 3 pieces Material : Iron + Nickel plate</p>
	<p>Washer × 3 pieces Material : Iron + Nickel plate</p>
	<p>Tooth lock washer × 2 pieces Material : Iron + Nickel plate</p>
	<p>Silicone rubber sheet × 2 pieces (Two pieces stuck together)</p>

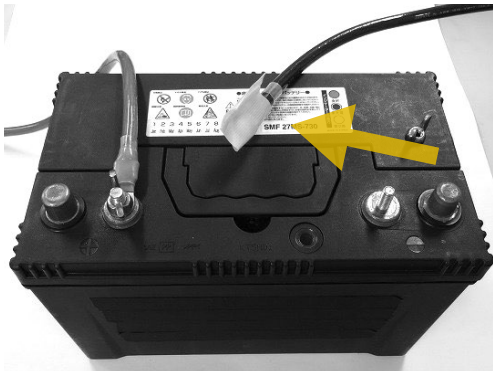
Installation

1. Before installing



○ Be sure that each terminal pole has a positive (+) and negative (-) mark on the sub-battery.

2. Remove the negative cable from the sub-battery

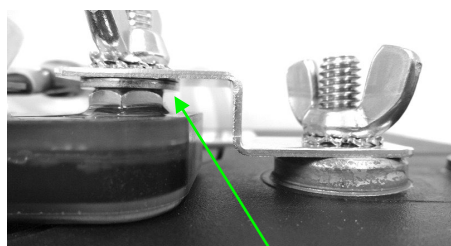
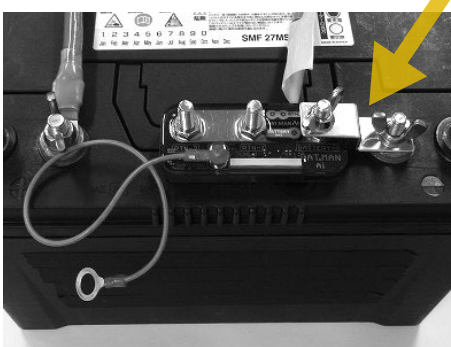


○ Power down all of the electronic equipment connected to the sub-battery.
○ Remove the nut or butterfly nut from the sub-battery on the side of the negative terminal.

Caution!

- When removing the cable on the negative side, keep the tip of the disconnected cable away from the other metal parts. The tip of the disconnected electric cable must be covered with packing tape.
- When the terminal of the sub-battery is blackened with dirt, please make it clean with a wire brush. Using an unclean battery may cause a malfunction or overheating of the connection part.
- Removing the wires of the sub-battery may reset the backup memory's settings etc. of the electronic equipment. Please be aware of this and use caution when removing any cables.

3. Install the BAT.MAN Ai



Washer

○ Connect the negative terminal of the sub-battery and "BATTERY—" terminal of the device with a battery metal fitting. The mounting direction of the device should be decided by wiring direction.

○ Make sure that the bottom of the device and the battery metal fitting are in parallel to the surface of the battery. If not in parallel, use the one or two attached washers.

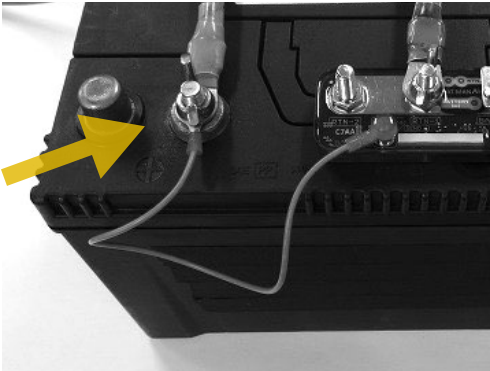
○ Tighten strongly with the attached butterfly nut. If the device is not fixed firmly in place, it may cause a malfunction or overheating of connection part.

After fixed, in case that the body of the device is not fully contacted from the surface of the battery or is not fixed firmly in place, the device should be conducted the following items after it is removed.

- After inserted attached tooth lock washers between the butterfly nut and the battery metal fitting, tighten with the butterfly nut.
- After attached silicone rubber sheets between the device and the surface of the battery, install the device, again.

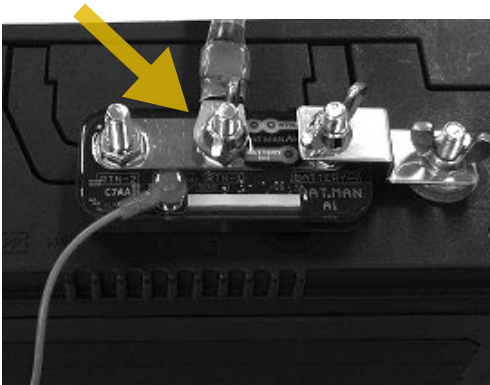
Installation

4. Connect the power cable of the device



- Remove the butterfly nut from the sub-battery on the side of the positive terminal.
- Connect the power cable (red) of the device to the positive side of the sub-battery.
- Tighten strongly with the butterfly nut. If it is not tightened properly, it may cause a malfunction or overheating of the connection part.
- Please be sure that the LED (orange) light of the device is flashing.

5. Connect the negative cable



- Connect the disconnected negative cable to a "RTN-1" terminal of the device.
- Tighten strongly with the butterfly nut. If the butterfly nut is not tightened properly, it may cause a malfunction or overheating of the connection part.

*The "RTN-2" terminal can also be used for the negative terminal of other equipment as the service terminal. (The "RTN-1" and the "RTN-2" are being connected with a metal plate inside the device.)

6. ID code

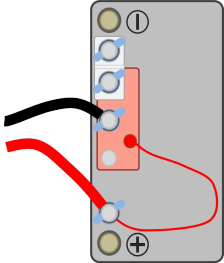
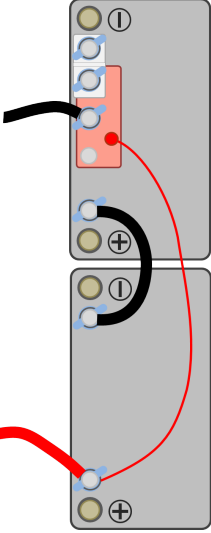
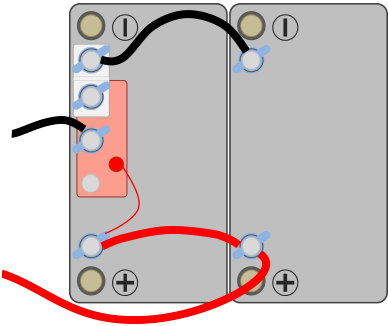
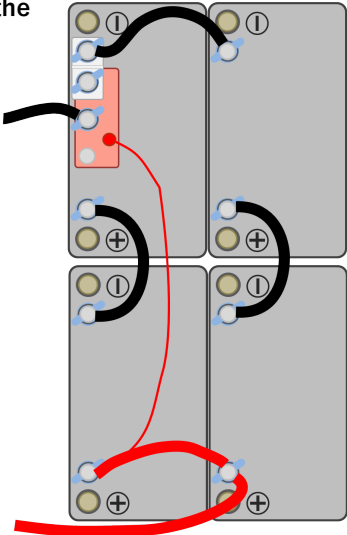
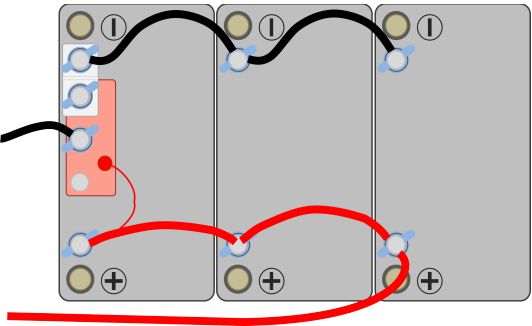


- Make sure that the identification code is located on the lower left of the device.

*This ID code will be needed when setting up your smartphone for use with this device.

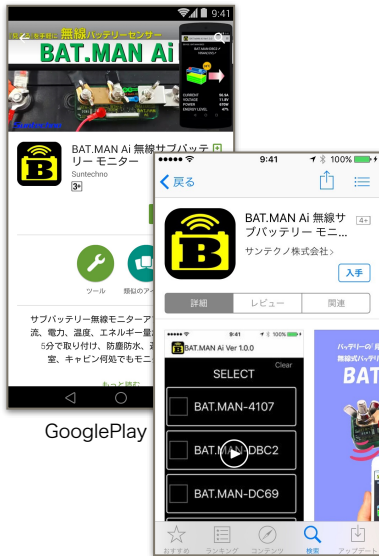
Connection Examples

Here are some examples for the combinations of various sub-batteries and BAT.MAN Ai.

12V system	24V system
<p data-bbox="105 443 300 472">A simple battery</p> 	<p data-bbox="791 443 1023 472">2 batteries in series</p> 
<p data-bbox="105 1046 352 1075">2 batteries in parallel</p> 	<p data-bbox="791 1046 1015 1146">4 batteries in a cluster such as the following</p> 
<p data-bbox="105 1648 352 1677">3 batteries in parallel</p> 	

Instructions for Smartphone App

Installation of the app



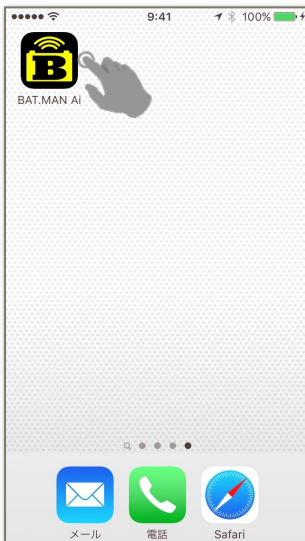
AppStore

○Simply type “BAT.MAN Ai” into Google Play or App Store search field to locate the correct application.

○Install the app via Google Play or App Store.

*The app can be installed for free.

Operation of the app



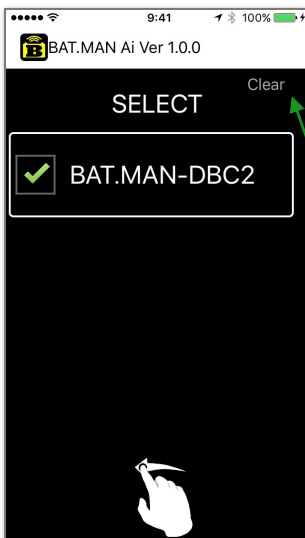
○Set Bluetooth settings with your smartphone and make sure that this functions is turned on.

○Tap the BAT.MAN Ai icon and operate the app.

○Prepare the ID code of the BAT.MAN Ai (call it “device” after this) you made sure when setting the device. (BAT.MAN-####)

Please refer to the instruction manual of your smartphone to see more information about your phone’s Bluetooth Settings.

Selection of device(s)



○After operating the app, a list of devices within range (about 10m) around the smartphone should appear.

○Make sure that the ID code of the device being set up is the same as the displayed ID code.

○Tap the displayed device to select it.

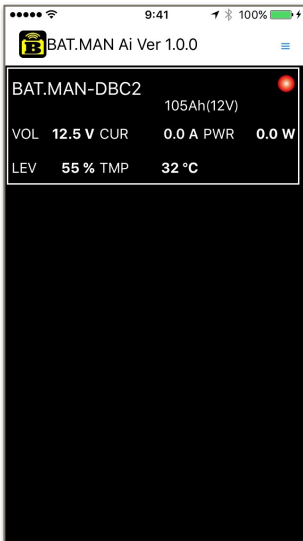
○By selecting, a checkmark should appear in the check box.

○After the checkmark appeared, swipe the screen to the left.

If another user’s device appeared, tap the “Clear” button at the top right on the display to clear the displayed devices and research devices around again.

Instructions for Smartphone App

List of device display



The selected device is listed.

These instructions are only for when one device is to be used.

When using multiple devices, please refer to P.14 “Instructions for Multiple Batteries”.

Displayed contents :

- Battery Name
- Battery type
- Battery terminal voltage
- Charge and discharge current
- Power consumption/charged
- Energy level
- Battery terminal temperature

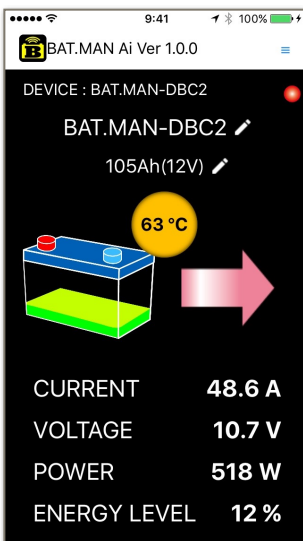
A background color shows the charging and discharging status of the sub-battery.

Black: No-load or disconnected

Red: Discharging

Blue: Charging

Individual device display



If you want to see the details of an individual device, simply tap the device on the display and the “List of device display” will change to the “Individual device display”. You can also change it to the Individual device display by swiping the screen to the left at List of device display.

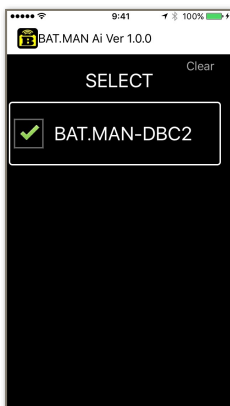
Displayed contents :

- Battery name (Refer to P.11 “Functions for Battery Name and Battery Type”)
- Battery type (Refer to P.11 “Functions for Battery Name and Battery Type”)
- Battery terminal temperature
- Charge and discharge currents
- Battery terminal voltage
- Power consumption/charged
- Energy level

When an electronic signal from each device is received, each receiving indicator (communication indicator) will blink. If the electronic signal from the device is not received for more than 10 seconds, the displayed value will be “- -”.

Moving between each page of display

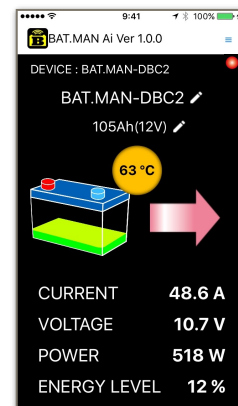
All pages of display can be moved to and viewed by swiping the screen to the left/right.



SELECT

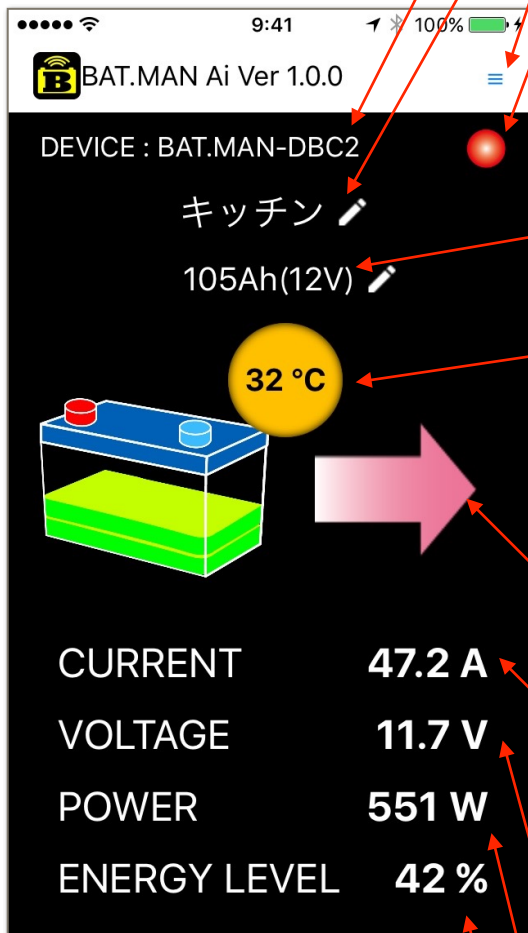


List of device display



Individual device display

Functions (for Display)



Name of each device

ID code is displayed.

Name of battery

A unique user name can be set up and displayed. (Press and hold)

Option button

A Low voltage warning system can be set up.

Communication indicator

It will blink upon receiving a signal.

The indicator blinks with interval of 0.7 seconds when the signal is strong. If the signal is weak (the device is too far or obstructed), the indicator will blink sparsely or not at all.

If an electronic signal from the device is not received for more than 10 seconds, each value will turn “- -” and charge/discharge indicator will not be displayed.

Battery Type

The voltage and capacity display of the sub-battery being used can be set up and displayed. (Press and hold)

Battery terminal temperature

A sensor embedded in the sub-battery connection terminal indicate a temperature. It can be measured from -15°C to 70°C.

If the temperature is over the measuring range of 70°C, the value will be displayed as “OVER”. If “OVER” is displayed, it is expected overheating due to a poor connection. Please make sure any accessories (such as bolts) are not loose.

Charge/discharge indicator

While charging, an animated blue left arrow is displayed. While discharging, an animated red right arrow is displayed.

CURRENT (battery charge/discharge current)

Can be measured from -200A to +200A.

An Overcurrent warning system is applicable. (Refer to P.13 “Instructions for Alarm Functions”)

If the current is a number in the range from -0.6A to +0.6A, the displayed value will be 0A since the measurement’s margin for error in this range is large. Also, the animation arrow is not displayed at this time.

VOLTAGE(voltage of the battery)

Can be measured from 5 to 35V.

A Low voltage warning system is applicable. (Refer to P.13 “Instructions for Alarming Functions”)

POWER (battery charge/discharge power)

Power consumption of the equipment being supplied by sub-battery is displayed. While charging, power supplied to the sub-battery is displayed.

ENERGY LEVEL

The energy level of the sub-battery is displayed in 5 levels of animation and percentage. Please refer to P.14 “About the Energy Level” for more details.

Functions (for Battery Name and Battery Type)



Battery Name

The original battery name is the same as the ID code of the device being used and it can be changed. Each device can be individually named.

How to change the Battery Name:

- Press and hold part of the battery name.
- When name entry field appears, input the new battery name.

For example, name the sub-battery for a kitchen in the cabin “kitchen”. Then the battery name on the display will be “kitchen”.

This battery name can be memorized and saved in a smartphone. From the app is rebooted, the named device is displayed as “kitchen” on the SELECT (selecting device) screen.

Other examples: AUX, rear battery, spare1, etc.

*If you press “OK” without typing anything in the name entry field, the name will reset to the first battery name (BAT.MAN-XXXX).



Battery Type

The voltage and capacity of the sub-battery is displayed under the battery name. (The original value for a 12V sub-battery is 105Ah)

How to set up the Battery Type:

- Press and hold display part of the battery capacity.
- Select the correct capacity and voltage (if the 2 batteries in series, select 24V) of the sub-battery from the list. If the exact capacity of the sub-battery is not displayed on the list, select the closest one.

Note:

- Properly set up the sub-battery you use in order to display the sub-battery being used and to calculate the energy level correctly.
- If the battery type is not set up or is set up incorrectly, the animation of the sub-battery and the displayed ENERGY LEVEL will be different from the actual value.
- After setting up the type of the battery, it is not necessary to input the type of sub-battery again. Even if the app is restarted, each battery’s information is already saved.

Instructions for Multiple Batteries



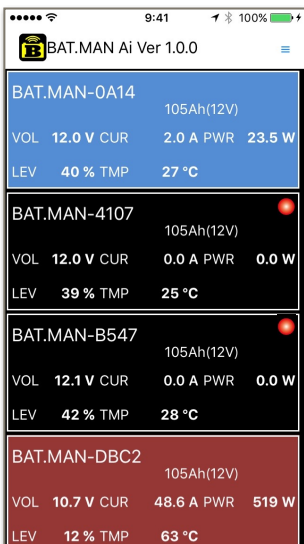
Selection of the multiple batteries (multiple devices)

If using multiple devices, up to a maximum of 10 devices can be displayed. If you want to see information about a specific device(s), tap the name of the device (BAT.MAN-XXXX) and checkmarks will appear.



Received history can be saved.

If another user's device appears, tap the "Clear" button at the top right of the display to clear the displayed devices and research devices around again.



List of devices display

Swipe the SELECT screen to the left to display a list of devices currently selected. Up to 4 devices can be displayed on the screen at the same time. Scroll the screen to see other devices.

Displayed contents :

- Battery Name
- Battery type
- Battery terminal voltage
- Charge and discharge current
- Power consumption/charged
- Energy level
- Battery terminal temperature

A background color shows the charging and discharging status of the sub-battery.

Black: No-load or disconnected

Red: Discharging

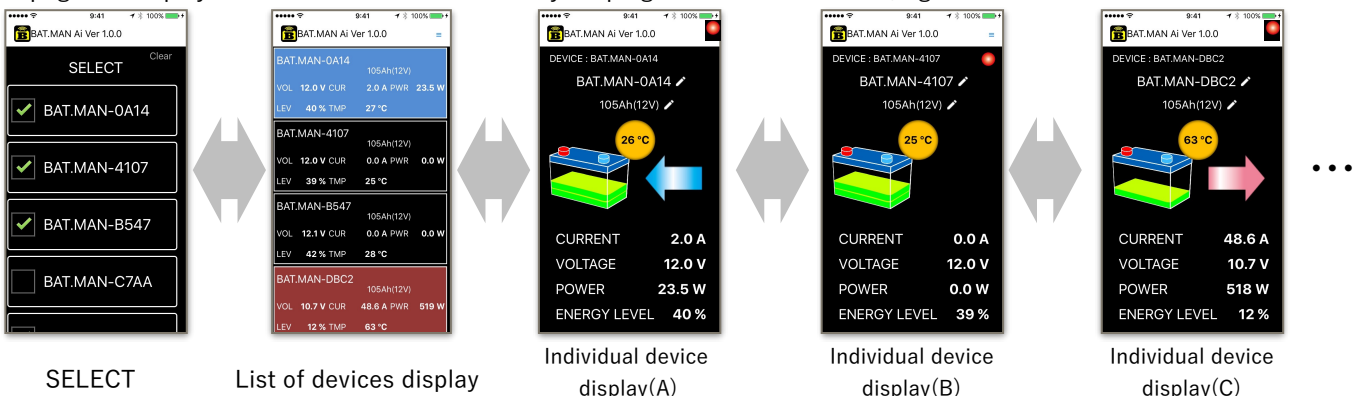
Blue: Charging

When the smartphone receives an electronic signal of each device normally, each indicator will blink.

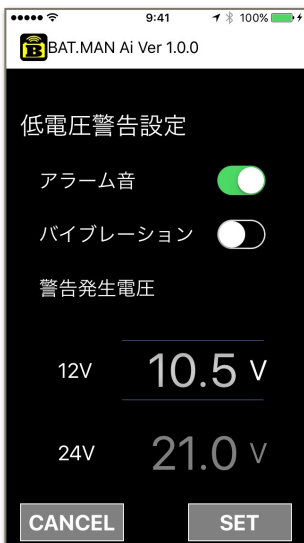
If the electronic signal of the device cannot be received for more than 10 seconds, the displayed value will be "- -".

Moving between each page of display

All pages of display can be moved to and viewed by swiping the screen to the left/right.



Instructions for Alarm Functions



Low voltage warning system

When the voltage of the sub-battery is lower than the set up value, a warning with sound and vibration will occur. The displayed value of the voltage and the display frame will turn red.

How to set up:

- Tap the option button to open the Settings display.
- The system can be set up to detect and screen voltage from a range of 10V to 12V and adjusted in increments of 0.1V.

*If the device is set up for a 24V battery, the displayed amount of voltage that can be screened and detected will be doubled in the settings.

- Set the alarm to sound or vibration or both by turning on each function.

Note:

- If you use multiple devices, this system cannot be set up for each individual device. (All devices are the same setting, but 12V and 24v can be mixed)
When at least one device becomes lower than the voltage in settings, the alarm will sound.
- ONLY when the **List of device(s) display** or **Individual device display** is being viewed, this system can be operated. The warning will not occur when the apps (such as a map and music player) are being displayed or this app is running in the task bar.
- The sub-battery cannot be monitored when the smartphone goes into sleep / standby mode (the screen is turned off) since Low Power Mode is on and communication function is off.
If you want to monitor the battery continuously, set Auto-Lock to “Never” in Settings on your smartphone.

Overvoltage warning system

The displayed value of VOLTAGE will turn red when the voltage of the sub-battery is over 30V.

If this warning appears, you must remove the device immediately and check the power system.

Using the device continuously while under a voltage warning may cause overheating or destruction of the device.

Overcurrent warning system

This displayed value of CURRENT will turn red “OVERLOAD” when the current of the device is over 195A even for a moment.

If this warning appears, you must turn OFF the device which caused the warning immediately or lower the electrical capability to the secure range.

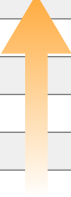
Using the device continuously while under a current warning may cause degradation or destruction of the device.

About the Energy Level

The energy level is calculated from the only voltage and current information and based on our original method. Its error might be large by the condition of charging and discharging of the battery and its temperature.

Please note that the energy level slightly differs from the actual capacity.

Energy level	Battery voltage	Battery current
Full	High	The discharge current is large
	High	The charge current is small
	High	The discharge current is small
	A bit low	The discharge current is large
	A bit low	The charge current is small
	Low	The charge current is small
	Low	The discharge current is small
Empty	Low	The charge current is large



Treatment for Not Using a Long Interval

The device will consume a current of about 10mA normally.

Please remove the power cable (red) from the positive terminal of the sub-battery when you do not use for a long time. Do not remove the power terminal (red screw) of the device.

The sub-battery can be used after remove the power cable of the device.

The tip of the electric cable disconnected must be covered with isolation packing tape, and kept away from the other metal objects.

Trouble Shooting

BAT.MAN Ai body

When the LED does not flash	Please be sure of the following items. <ul style="list-style-type: none">• The “BATTERY—” terminal of the device is connected to the negative terminal of the sub-battery.• The power cable (red) of the device is connected to the positive terminal of the sub-battery.• The voltage of the sub-battery should be 5V and over.• The voltage of the sub-battery should be 30V and under.
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Smartphone app

The application cannot be installed	The smartphone being used may not be compatible with this application. Please refer to P.3 Compatible smartphones in “Usage Guidelines”.
The device cannot be found	Please be sure of the following items. <ul style="list-style-type: none">• The Bluetooth of the smartphone must be turned on.• The origin of the signal must be within reach (within 10m).• Press the “Clear” button and delete the received history.
The communication is unstable	This problem may occur when the device is too far away from the origin of the signal. (In an area where there is no signal) Signal is not received further than 10m.
What is the ID code?	The ID code consisting of four character hexadecimal number displayed after device search, and an identification value allocated to the body of the BAT.MAN Ai. It is located on the upper surface of the BAT.MAN Ai device.
Became unable to know the ID named to the battery name	The ID and “BAT.MAN-XXXX” is displayed at the top of the screen. The device name will remain as the initial value (BAT.MAN-XXXX) by pressing the “OK” button as long as the input field is blank.

Specification

BAT.MAN Ai body

Voltage Measurement Range	5~30V
Voltage Measurement Resolution	±0.1V
Current Measurement Range	±200A
Current Measurement Precision	±2A and under in the current measurement range
Current Measurement Resolution	±0.1A (±100A and over → ±1A)
Power Supply Voltage	12V and 24V for the lead battery
Power Supply Current	Average 10mA
Maximum Peak Current	±200A
Maximum Load Power	Total power consumption 12V sub-battery: Up to 1kW 24V sub-battery: Up to 2kW
Communication Range	About 10m
Sampling Interval	About 0.7 seconds
Transmit Frequencies	2.4GHz bandwidth (Bluetooth LE)
Operation Temperature Range	-10~50°C
Case	Resin sealing structure
Terminal Configuration	M8 screw (nickel plate) × 3
Power Terminal Configuration	M10 ring terminal (the tip of a red wire)

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